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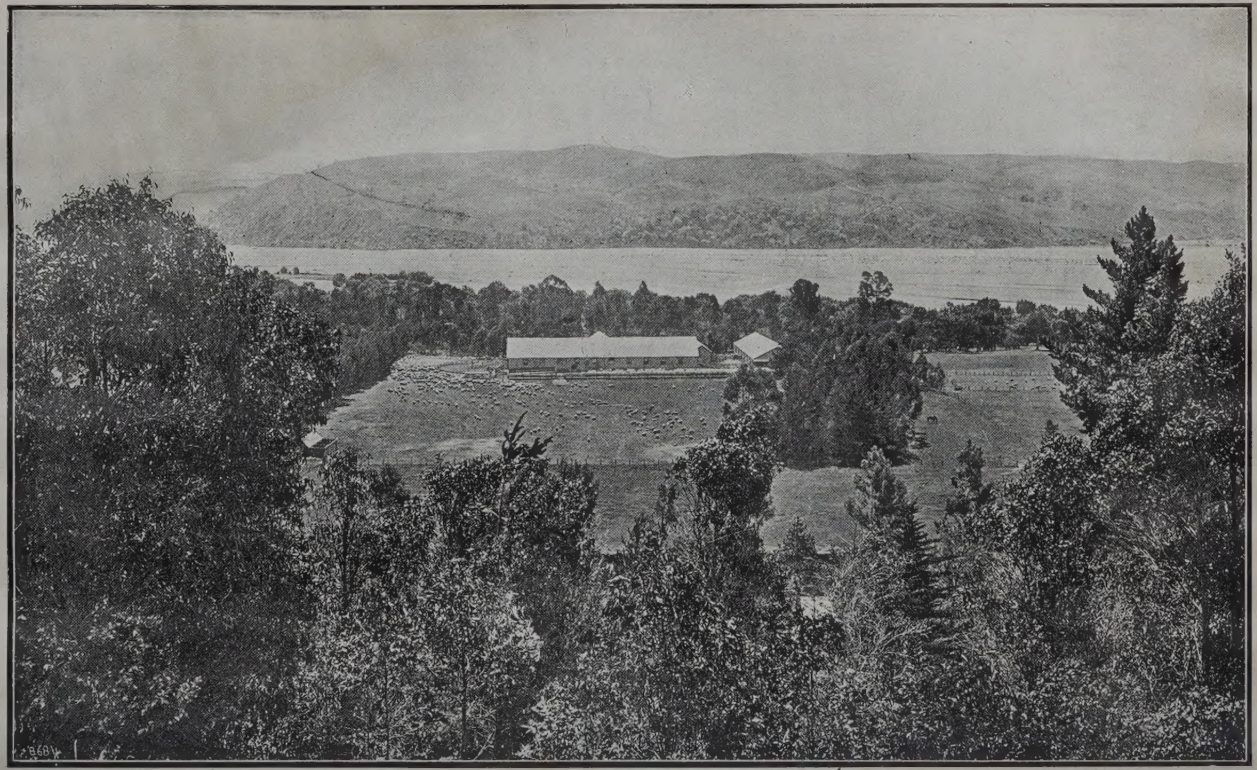


Shearing-time in Hawke's Bay.

The

Journal of Agriculture.

WELLINGTON, NEW ZEALAND.

20TH DECEMBER, 1915.

AGRICULTURAL CREDIT.

T. D. H. HALL.

ONE of the most important factors in agricultural development and production is the availability to the farmer, at a reasonable rate of interest, of capital sufficient to enable him to effect necessary improvements, and to purchase live-stock, implements, fertilizers and other things required in his expanding operations.

In New Zealand money has been cheapened and increased facilities for obtaining it have been afforded by the advances-to-settlers system, and this enterprise of the State has conferred very great benefit on the farming industry. But beneficial as has been this system, it does not reach all those desirous and worthy of financial assistance, nor does it take into account and set a monetary value on the whole of the resources which the farmer has to offer as security for the working capital he requires. Our State Advances Department deals with the individual, and works on the basis of an

adequate mortgage security for the loan required. The association of individual resources as security for the purpose of obtaining credit for the members of the group has not been organized; the class of small settler with no adequate mortgage security to offer is not reached; the immense and very real security of the honesty, industry, and capacity of our farmers in general is not given a market value. It has been the aim of far-sighted men in the Old World who have recognized the importance of agriculture and of the agricultural population in the polity of the State, and who have been anxious to ameliorate the lot of the man on the land, to increase credit facilities by co-operative pooling of security, and to capitalize the honesty, industry, and capacity of the farmer. Several schemes were devised, and have been applied with striking results.

The question has attracted attention in New Zealand, and an Agricultural Banks Bill was brought before Parliament a few years ago, although not proceeded with. The Board of Agriculture was recently asked to go into the matter, and one of the members of the Board, Mr. Edwin Hall, prepared a memorandum dealing with what has been done in other countries. This document, while showing the greatness of the results, also brought out how different from those in New Zealand were the conditions in the Old World, with its dense population, small holdings, and intense cultivation; how much more favourable for the introduction of co-operative credit was the intimate association for centuries back of the village communities; how much more urgent the poverty of the small holder and the usurious methods of the money-lender made the question of finding relief. Mr. Hall also showed that in New Zealand opinions differ as to the necessity for introducing new credit schemes. It is argued that there is the State Advances system to meet demands for long credit, while auctioneering concerns and (to some extent) co-operative dairy companies are advancing money to enable their needy clients or suppliers to stock their farms. Advocates of increased credit facilities reply, however, that the auctioneering and dairy concerns would gladly be relieved of the risk of financing struggling settlers, while the State Advances Department is even now unable to fully meet all applications for loans.

The Board of Agriculture concluded that the demand in New Zealand for greater credit facilities was not yet so general as to warrant special legislation, but recommended that the subject be given further publicity with a view to showing what was being done elsewhere and what could be done in the Dominion without special legislation. This initial article has accordingly been written, Mr. Edwin Hall's memorandum being largely used as its basis. It

is difficult to reduce to the compass of a short article the mass of information and statistics that have been published on this subject. An endeavour is made below, however, to give a very brief description of the most important and successful types of institutions, with some figures as to their operations.

RURAL BANKS AND CREDIT ASSOCIATIONS.

These follow principally the Raiffeisen type (named after the original founder), with modifications to suit local conditions. They operate among small cultivators as a rule, and the credit given is generally personal. The individual loans are comparatively small. Three fundamental principles were laid down by the originator, though, as will be seen, they have been departed from to a certain extent: (1.) Unlimited liability of the members of the banks. This increases the facility for raising money required by the banks, and increases the sense of responsibility of the members. Limited liability has, however, now been adopted in some cases, and in Great Britain, where there is a popular prejudice against unlimited liability, a bulletin was recently issued by the Board of Agriculture describing how banks on this basis might be formed. The bogey of unlimited liability is more apparent than real, and it is the boast of these banks that there have never been any calls on their members. (2.) Restricted area of operation. It is essential that members should be closely associated in view of their collective liability. A man must be held in good repute amongst his neighbours before a loan is granted to him by the bank. (3.) Gratuitous management. The organization is simple, and the administration of the work of the bank is laid upon a committee of management. Here again, however, there has been in practice a departure from this principle in some cases, and payment of a treasurer is sometimes adopted.

Funds for the operations of the banks are derived in different ways by different institutions. The principal sources of the money required are from shares paid up by members, from reserves built up from the difference between the interest paid by banks for money and the interest charged to borrowers, from the deposits of members' savings, and from loans raised from outside on the security of all the members' credit. The proportion of share capital to the total amount dealt with by the banks is extremely small. The original Raiffeisen system did not contemplate the issue of shares at all.

Advances are made to members for reproductive works, and, owing to the restricted field of operations, the expenditure of the loans is under the eye of all members. Failure to expend the

money on the purpose for which borrowed would result in its being called in immediately.

The greatest development of these banks has taken place in Germany. The following figures for 1909, the latest immediately available for reference, indicate the extent of operations: Number of banks which made returns, 12,614; number of members, 1,163,186; total loans granted in the year, £44,115,544. In Italy, France, Belgium, Ireland, &c., rural banks of this type are becoming increasingly popular, while British India affords a notable example of the success that has followed their establishment. Stress is laid on their moral value in inculcating thrift and increasing independence.

POPULAR OR PEOPLE'S BANKS.

Another type of bank through which agriculturists have been able to obtain loans in many European countries is that of the popular or people's banks. The operation of these banks is not confined, as in the case of the rural banks, to the farming community. They are often known as "urban banks," and a large proportion of their business is done with artisans and other dwellers in the cities. They are carried on on different lines from those advocated by the founder of the rural banks. Their field of operations is not restricted; they have a large share capital on which dividends, often considerable, are paid; the management is not free, and limited liability is commonly employed. Each member must take up a share, the amount of which varies with different banks. It may be paid up by instalments, and remains the property of the member. If he withdraws from the bank he takes out the amount of his share. There is also an entrance fee payable in most banks, which goes to the reserve fund and remains the property of the bank. Deposits are encouraged from members, and are also received from others. Further sums required by the banks for their operations are derived by means of loans raised on the joint security which they have to offer. Almost all kinds of banking business are carried on by the banks, but their primary object is the making of loans to members for short periods. In most cases loans made by the banks are secured by sureties or by acceptances. In a limited number of cases money is lent on mortgage or pledge. Quite large profits are made by some of these banks, part of which is distributed in the form of dividends.

Some of the people's banks embody various features of the Raiffeisen system. Among these may be cited the co-operative people's banks in the Canadian province of Quebec, which have been a wonderful success.

CO-OPERATIVE LAND CREDIT ASSOCIATIONS.

These are based on the principle of the pooling of the resources of groups of landowners for the purpose of obtaining loans for the individuals. The whole of the lands of the members of the association are pledged as security. The association does not raise a loan, but issues bonds. The total amount of bonds issued must not exceed the amount of loans outstanding to members of the association. The bonds are negotiable on the market, and are readily taken up by the public. If a member desires a loan from his association, his land is valued, and bonds for the amount of the loan up to two-thirds of the value of the land are issued to him. These he can realize on the market. The bonds bear a rate of interest, and the borrower has to pay his association a slightly higher rate. The difference goes towards expenses, the establishment of reserves, and the extinction of the debt. The loan must be paid back in bonds to the association—that is, at the due date the borrower must buy bonds of his association on the market and hand them over. This system has been wonderfully successful in Germany. It has enabled farmers to borrow money at from $3\frac{1}{2}$ to 4 per cent., and in 1909 the loans made through these associations to their members stood at £172,800,000.

THE SASKATCHEWAN SYSTEM.

About two years ago the Legislature of the western Canadian province of Saskatchewan passed a measure entitled the Co-operative Farm Mortgage Associations Act, to facilitate the raising of long-time loans by farmers. Under this system associations of not less than twenty-five farmers, all of whom are desirous of raising loans, issue bonds or debentures for the total amount required by members. The bonds are guaranteed by the Government, and each member of the association pledges his credit for the amount of his own loan and up to half as much again. This latter provision is for the purpose of meeting the contingency of a member making default and of his security failing to realize the amount of his loan. In such case the rest of the members would have to make the balance good *pro rata* according to the extra amount pledged by them in the manner indicated. A loan to a member must not exceed 40 per cent. of the value of the land taken as security. It was intended to float bonds through the agency of a central bank to be created and guaranteed by the province, thus enabling money to be borrowed on favourable terms. Owing to the war, however, the putting into operation of the Act has been indefinitely postponed.

CONCLUSION.

It will be seen that co-operation is the basis of all these schemes of agricultural credit. Many of the leaders of the movement for increasing credit facilities are emphatic in urging that the spirit of self-help should be encouraged, and that the Government should not do more than exercise a benevolent supervision. In Great Britain arrangements have quite recently been made for agricultural credit associations to obtain facilities from joint-stock banks, this being viewed with more favour than that the Government should itself advance money for loans. In New Zealand co-operation has been applied with marked success in several directions, particularly in the field of production, our dairy factories being the most notable instance. It is possible to greatly extend the co-operative principle in the Dominion, and in the sphere of agricultural credit there is no reason why the principle should not be applied here, in one form or another, as successfully as it has been in other countries.

CHICORY.

ALTHOUGH chicory is often included in grass-seed mixtures, it is doubtful whether its addition is desirable. Certainly the herbage is eaten by stock, but the amount produced is small, and the plant soon runs to seed. One of the reasons why the use of chicory has been advised is the deeply rooting nature of the plant. In this respect, however, it is not much different to catsear, and it is hard to understand where any real value comes in. Chicory, in my opinion, should be classed in much the same category as catsear, and if it is correct that the former is a valuable pasture plant, then our estimate of the latter would have to be modified. It is true that the herbage of chicory is more relished than that of catsear, but the amount produced under ordinary pasture-conditions is too small to have much effect on the productivity of the pasture. It seems well, therefore, to class chicory as really a weed in pastures, notwithstanding the many laudatory accounts published in text-books concerning the value of the plant.

Chicory is also grown as a special crop for the sake of the roots. These are dried and crushed and added to coffee. Originally the addition of chicory to coffee was largely for adulteration purposes, but the flavour that it imparts to this beverage is much appreciated by many people, and coffee is now rarely sold pure. It is interesting to note that chicory has been grown for this purpose in certain parts of New Zealand, notably in the vicinity of Christchurch and Dunedin. During the past few years the imported article could be procured cheaper than the locally grown, but the great war has changed the position, and this season the cultivation of chicory has again been undertaken in the Dominion.—*A. H. Cockayne.*

SEEDS AND THEIR INDENTIFICATION.

CONTINUED.

E. BRUCE LEVY.

(1.) Ox-tongue (*Picris echioides*).

(2.) Hawkweed Picris (*Picris hieracioides*).

(3.) Salsify (*Tragopogon porrifolius*).

(4.) Chicory (*Cichorium Intybus*).

(5.) Prickly Lettuce (*Lactuca virosa*).

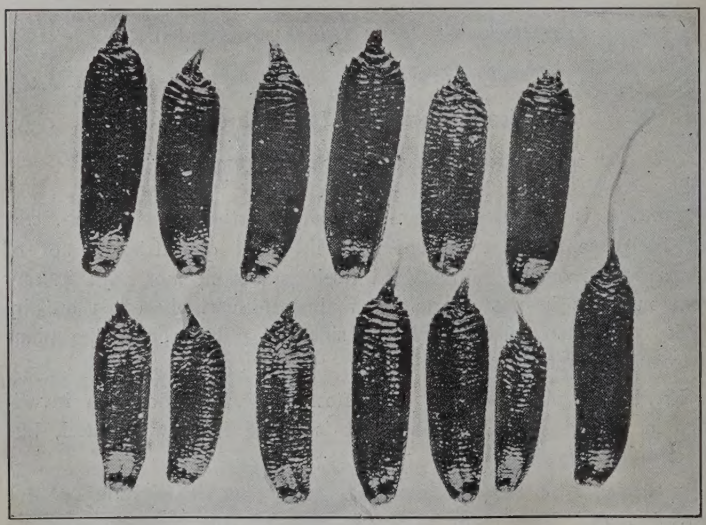
OX-TONGUE is a very common impurity in the larger clover-seeds, but its presence in a line of seed in small quantities is not of any serious moment. The weed itself is seldom met with in any great numbers in pasture, as it is almost invariably eaten out by stock. In waste places, such as sides of railway-lines, the plant is frequently met with.

Hawkweed picris seed is not often met with, and then invariably in imported seed. The plant is found in New Zealand, but is extremely rare.

Salsify-seed is very seldom met with, and then only in undressed lines. The plant is rather rare in New Zealand, but its striking appearance and bold flower-heads render it so conspicuous that its presence may always be noticed by the farmer. It is not by any means serious, as when present in pasture it is generally eaten down to the ground. When thus eaten down it disappears in a season or two. In waste places it generally remains from year to year, but never seems to spread far, although the seeds must be distributed over considerable areas. At one time salsify was esteemed as a vegetable, and the seed is still quoted in most seed-catalogues. The presence of salsify-seed in a sample is a clear indication that the seed has not been machine-dressed, as the individual seeds are far larger than those of any of the clover-seeds among which it is found.

Chicory-seed is very common in the larger clover-seeds, but its presence is of no great importance. The plant is commonly ranked as one of agricultural value for pastures, and the seed is often included in grass-seed mixtures. The wide distribution of chicory in New Zealand is mainly due to its presence in certain lines of clover-seeds, but in the immediate neighbourhood of Christchurch and Dunedin it has spread in past years from the fields where the plant was originally grown as a field crop.

Prickly-lettuce seed is very rarely met with. The plant is extremely rare in New Zealand.



OX-TONGUE (PICRIS ECHIOIDES). ENLARGED 10 DIAMETERS.

OX-TONGUE.

Size: Average length without beak, $\frac{2}{15}$ in.; average width, $\frac{1}{25}$ in.

Colour: Varies from a yellow to a chestnut or dark yellowish-brown.

Shape: Oblong and oval in section. The apex is drawn out into a fairly long slender beak terminated by a white feathery pappus. This pappus, however, together with the greater part of the beak, is invariably broken off when the seed is present as an impurity. The beak remaining is short, varying from a mere stump to about a quarter as long as the seed itself. The base

is very bluntly pointed, and bears a minute scar the centre of which is markedly depressed. The base of the seed usually bears five fairly distinct grooves, which extend from the depression to a short distance up the seed. From the apex to the base the seed is covered with transverse corrugations or etchings, which give the surface a wavy appearance characteristic of this seed. The seed is usually straight, but at times is slightly curved. Fairly long shallow indentations are frequently met with in the sides. In general the surface is rough and fairly glossy.

Ox-tongue-seed is found in samples in two quite distinct forms, as with hawkbit (*Leontodon hirtus*). The seed described above is by far the commoner, and is the one found in the central portion of the seed-head. Around the outer ray are borne seeds of quite

OX-TONGUE (PICRIS ECHIOIDES) SEEDS OF THE OUTER-RAY FLORET. ENLARGED 10 DIAMETERS.

a different colour and shape. In size also they are larger. In colour they are of a dirty pale straw. In shape they are much curved and distinctly pointed. The base is marked with a distinct broad white-coloured scar. The seed is not transversely etched, but is covered more or less with slender whitish hairs. The surface is somewhat rough and dull.

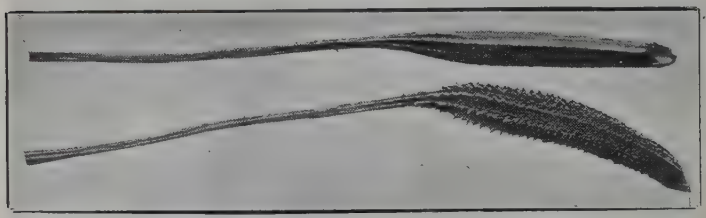
HAWKWEED PICRIS.

Size: Average length, $\frac{1}{9}$ in.; average width, $\frac{1}{32}$ in.

Colour: Varies from a yellow to a rich dark brown.

Shape: Oblong and oval in section, usually much curved. The apex is not drawn out into a beak as is that of ox-tongue,

but terminates in a whitish feathery pappus mounted on a very short neck. Usually in mature seeds the pappus is removed when the seed is present as an impurity. At times, however, it is attached, especially in seeds that are not quite mature. When the pappus is removed the apex presents a conspicuous whitish scar in the form of a minute crown the centre of which is raised by a small projection. The base is very bluntly pointed, and bears a small depression. From the base to the apex the seed is very deeply transversely corrugated or etched, the corrugations being more distinct than are those in ox-tongue. Extending from the base to the apex are five distinct grooves. These grooves and the lack of beak readily distinguish this seed from that of ox-tongue. In general the surface is much roughened and of a dull appearance.



SALSIFY (TRAGOPOGON PORRIFOLIUS). ENLARGED $3\frac{1}{2}$ DIAMETERS.

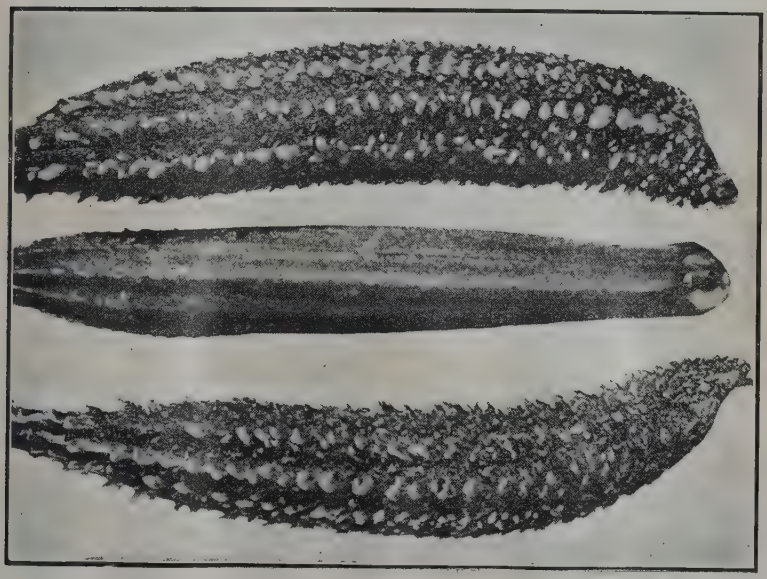
SALSIFY.

Size: Very large, average length without beak, $\frac{9}{16}$ in.; average width, $\frac{1}{11}$ in.

Colour: Light straw to a dark chocolate-brown.

Shape: Elongated, somewhat spindle-shaped, round or nearly so in section. The seed tapers towards the apex, which is drawn out into a long slender beak usually about as long again as the seed itself. Surmounted on this beak is a large feathery pappus of a dirty old-gold colour. The seed when found in seed-samples is devoid of pappus and a greater portion of the beak. The base is decidedly truncate, and is marked by a very conspicuous scar in the form of a deep cavity. From the centre of this cavity protrudes a small tongue-like structure which extends out to the rim of the cavity. Extending from the base to the apex are ten more or less distinct ridges. These ridges are varyingly covered with whitish, upwardly directed, scale-like projections. Some seeds, however, are entirely free from these scale-like

HAWKWEED PICRIS (PICRIS HIERACIOIDES). ENLARGED 10 DIAMETERS.



SALSIFY (TRAGOPOGON PORRIFOLIUS). ENLARGED 10 DIAMETERS.

projections, being quite smooth. This variation in surface-marking is due to the different positions held in the seed-head. Those seeds on the outer rays are dark-coloured and much roughened by scale-like projections, those in the centre are usually smooth and of a lighter colour. The ridges usually run straight down the seed, but at times are twisted, making the seed somewhat spindle-like in appearance. The seeds are usually curved towards the base, but at times are quite straight. In general the surface is rough and dull.

CHICORY.

Size: Average length, $\frac{1}{9}$ in.; average width, $\frac{1}{20}$ in.

Colour: Light straw to almost black, frequently mottled.

Shape: Somewhat wedge-shaped, the point of the wedge being the base. In section more or less four-angled. The apex is broad and somewhat crown-shaped. The rim of this crown is surmounted by a double ringlet of small chaffy scales, the whole ringlet constituting the pappus. This pappus is very persistent, but at times is partly rubbed off. The centre of the crown is slightly raised by a small projection. The base of the seed is very bluntly pointed, almost truncate, and bears a well-marked whitish scar. The seed is variously ridged lengthwise, which gives the seed a wrinkled appearance. The surface is covered with minute transverse etchings, giving it a roughened look. The seed is usually slightly curved, the curvature being in the face and not in the edge. In general the surface is rough and dull.

PRICKLY LETTUCE.

Size: Average length without beak, $\frac{1}{7}$ in.; average width, $\frac{1}{26}$ in.

Colour: Dirty dark brown.

Shape: Broadly lance-shaped, much flattened. Very similar to the dark-coloured variety of garden lettuce. The apex is drawn out into the beak which is about as long as the seed itself, and which is surmounted by a feathery pappus. The beak, however, is usually broken off quite close when the seed is found as an impurity. The base is bluntly pointed and bears a well-marked circular scar. Extending from the base to the apex on each face are from five to seven well-defined ridges with wide interspaces. Each edge also bears a ridge. On each ridge are fine whitish teeth, which increase in size towards the apex. Teeth are also present over the interspaces. The seed is generally much curved, the curvature being for the most part in the face, occasionally

CHICORY (CICHORIUM INTYBUS). ENLARGED 10 DIAMETERS.

PRICKLY LETTUCE (LACTUCA VIROSA). ENLARGED 10 DIAMETERS.

in both the face and the edge. In general the surface is rough and dull.

The following table, compiled from analyses made in the Biological Laboratory, shows the relative frequency of occurrence of these five seeds in the main agricultural seeds.

Agricultural Seed in which found.	Of 100 Samples examined—				
	Ox-tongue was noted in	Hawkweed Picris was noted in	Salsify was noted in	Chicory was noted in	Prickly Lettuce was noted in
Perennial rye-grass ..	..	..	Of all samples examined, found only once.	..	Of all samples examined, found only twice.
Italian rye-grass ..	..	..		..	
Cocksfoot	1	..		..	
Crested dogstail ..	..	..		..	
Chewings fescue ..	..	.		1	
Timothy	..	..		1	
Meadow-foxtail ..	..	..		..	
Fiorin	..	..		..	
Poa pratensis ..	..	..		..	
White clover ..	1	..		1	
Alsike	..	..		..	
Cow-grass	30	4		18	
Red clover	22	4		18	
Lucerne	10	..		21	
Lotus	4	4		4	

Ox-tongue was also noted in sheep's parsley.

Chicory was also noted in Egyptian clover, Bokhara clover, and sheep's burnet.

NEW TREATMENT FOR VINE MILDEW.

OIDIUM of the vine is probably more amenable to treatment than any other fungus. At the present time sulphur is the standard remedy, but although, if fine weather prevails, it will readily destroy the growing portion of the fungus, it has the disadvantage of being easily washed off by rain. During the past two or three seasons permanganate of potash has been extensively used in France. This solution is apparently the more serviceable of the two treatments, for it is reported to be giving good results even under moist conditions. Sulphur is useless when moist conditions prevail. This being quite a new method of treatment, growers are, of course, advised to try it first only on a small scale, and then compare the results with those of the older remedy. If it proves successful in New Zealand the advantages of the new preparation are obvious, for it may be applied under any conditions. The dose to be used is 1 lb. permanganate of potash per 100 gallons of water, and the vines are sprayed with the mixture. The permanganate should be completely dissolved in warm water first, and the solution then made up to 100 gallons.—*A. H. Mazure.*

THE RENNET-SUPPLY FOR CHEESEMAKING.

A PROSPECTIVE NEW INDUSTRY.

D. CUDDIE.

By the term "rennet" in dairying is understood the liquid or powdered preparations used for purposes of cheesemaking, and containing as their chief constituent a special ferment which exerts a powerful action on the caseous matter of milk. This ferment is found in the stomach of a large number of animals, and is especially abundant in the stomach of calves. On account of the ease with which they can be procured, these animals are used almost exclusively as a source of rennet-supplies.

Rennet is the only suitable medium for coagulating milk for the manufacture of cheese, therefore in the absence of the requisite quantity of this constituent cheesemaking would have to stop. What this would mean to New Zealand can be more readily imagined than discussed, but we may hope that there is no immediate danger of such a thing happening to our cheese industry, which is now valued at considerably over two and a half millions sterling per annum.

It is well, however, at a time like this, when all branches of commerce are liable to interruption, that we should be prepared against the possibility of supplies of rennet being short, or perhaps entirely cut off. It must be remembered that New Zealand has to depend almost wholly upon European Continental sources for its supply of rennet, Sweden, Denmark, and Holland being the principal rennet-exporting countries. If, therefore, this trade to the Dominion should be hampered owing to the war it would be a bad day for our cheese industry, unless some provision be made to otherwise furnish the rennet required. When the war broke out the probability of rennet-supplies for New Zealand being interrupted was taken into consideration. It was then learned that for this season at least the full supply might be expected, a good deal of it already being on the water, and an assurance obtained that the remainder would come forward; therefore up to the present time there has been no cause for alarm. It was thought expedient, however, that some inquiries should be made in England regarding

the preparation of rennet for cheesemaking, and also as to whether we could depend upon Great Britain furnishing even a portion of our needs. The Inspector of New Zealand Dairy-produce in London (Mr. W. Wright) was accordingly asked to make full inquiries on the subject. The following are extracts from reports furnished by him :—

The Intelligence Department of the British Board of Trade supplied me with the names of four firms, three in England and one in Ireland, who were supposed to be manufacturers of rennet. On investigation I found that two were out of business as actual manufacturers, and were merely agents for Continental firms now. The only two firms that are making rennet in this country are, so far as I can find out, the Viking Rennet Company (Limited) and Messrs. Fullwood and Bland, both of London.

Messrs. Fullwood and Bland, although manufacturers of rennet, have to import the vells (stomachs) from the Continent for that purpose. At the same time endeavour has been made to encourage those interested in this country to save the vells of all young calves slaughtered, but up to the present the firm have not been very successful in obtaining sufficient supplies, the argument being that the price offered was not worth the trouble that the saving of the vells would entail. When I called on the firm Mr. Bland told me that it might be possible to fill an order for, say, 1,000 gallons if placed in the near future, and they would guarantee that the rennet was of British manufacture. They estimate that they do about 75 per cent. of the English trade. I am advised that their system of drying rennet is a secret process, and not even the workmen of the firm are allowed to go into a particular building. Boracic acid is used as a rennet-preservative by this firm.

With reference to the Viking Rennet Company, this is a firm of British manufacturers obtaining the necessary vells from various parts of the world, but the chief supply comes from Poland and neighbouring parts. That the best vells are obtained from those localities where there are large Jewish communities has been the experience of this firm, who are inclined to believe that the care of calves and method of slaughter may have something to do with the quality of the vells. The experiment of importing vells from the United States of America has been tried, but has not been altogether a success on account of the careless treatment of the vells before shipment. Vells are also collected in Britain, but the quantity is nothing like sufficient for this firm's requirements.

Prior to the war the bulk of the vells came through Germany, principally through German houses at Hamburg and Leipzic. The Germans managed to get the bulk of the trade through advancing the necessary cash to the Eastern butchers to enable them to carry on the business of purchasing and collecting the vells. Should Germany be successful in seizing Riga it is expected that the supplies of vells to Scandinavian houses will be cut off. Some years ago large supplies of vells used to come to hand from Ireland, but the trade has died out entirely.

The inference, so far as I can gather, is that the supply of rennet in the near future is likely to be uncertain, and it is not at all unlikely

that there will be a considerable shortage, so that the outlook generally is not very hopeful.

With a view to facing the New Zealand requirements, I would suggest that there are two courses open that might be worth considering. One is to form a co-operative rennet-manufacturing company supported by the various dairy companies engaged in cheesemaking; the other is for the dairy companies to manufacture rennet for their respective requirements, drawing upon the various milk-suppliers of their factories for the necessary stomachs if the supply from abattoirs and freezing-works was not sufficient. If either course should be decided upon, arrangements might be made to engage an experienced man either to manage the rennet-factory, or, in the alternative, to act as instructor to dairy-factory managers should the second method of procedure be decided upon.

I am led to make these suggestions as, judging from the present viewpoint, it is not improbable that New Zealand will require to be practically independent of outside sources of rennet for some time to come at least. This, of course, is contingent on existing war-conditions and the duration of the war. I am watching the position closely, and expect to send forward a further report in the near future.

During the course of his investigations Mr. Wright obtained several formulæ or particulars of the methods of manufacture of rennet, also diagrams which are reproduced herewith. Messrs. Chr. Hansen, of Little Falls, New York, one of the principal manufacturers of rennet in the United States of America, supplied the following information regarding the preparation of calves' stomachs:—

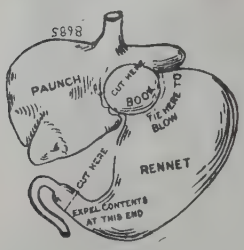
Only the rennets from sucking or milk-fed calves are valuable. The stomachs of calves raised on grass or other solid food are not good for the purpose.

When the calf is killed, immediately cut out the rennet, leaving a portion of the third stomach (the book) attached to it. Carefully squeeze out the contents of the rennet (consisting of coagulated or other partially digested food), but do not turn the rennet inside out or wash it, as this would cause a loss of the ferment. Rinse any dirt from the outside (but not inside) and trim off any adhering fat. Either of the following methods may be used for preparing the rennets for shipment to the laboratory.

The Air-drying Method.—Tie up the opening in the large end, applying the string to the narrow passage between the third stomach, or book, and the rennet. Insert in the opening of the long neck at the other end a small tube of glass or any other material, blow up the rennet as hard as possible like a football, and tie up with string under the tube. Where many rennets are handled it is convenient to have a pointed tube connected with air-pressure to inflate them.

The long narrow neck contains but little of the ferment, and may be cut off after drying. Hang the inflated rennets in a draughty shed or a warm dry room, but do not expose them to more heat than that of an ordinary warm room. Never hang rennets in the open exposed to the sun.

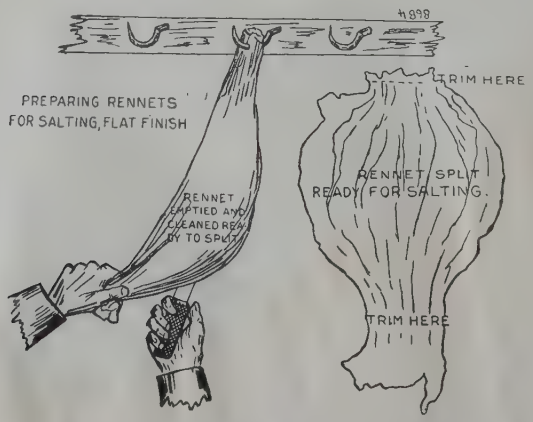
Where a fan can be used to create draught it will help dry the rennets quickly, and the process should not take more than a week. They should not be left moist long enough to mould or putrefy, and care should be taken that they are not infested with maggots or insects after being dried and bundled for shipment—*i.e.*, they should be thoroughly dried and carefully protected from flies and other insects.



The Air-drying Method.

When a sufficient number of thoroughly dried rennets have accumulated cut off the neck and let out the air; tie up the rennets in bundles of twenty-five or fifty, and pack in cases or barrels.

The Salting Method.—When it is not convenient to blow up and dry the rennets they may be prepared for immediate shipment by splitting open and salting. Squeeze out the contents of the stomach, trim off the fat, split open, and cut off book and small end. Salt thoroughly on both sides, using sufficient, so that after allowing them to drain there will still be plenty of dry salt left between the rennets. Leave them in a cool place to drain overnight, then pack for shipment in a tight tub or barrel.



The Salting Method.

PREPARATION OF THE CALF'S STOMACH IN RENNET-MAKING.

In view of the foregoing information from Mr. Wright, it would seem imperative that the question of future supplies of rennet should be carefully considered by those in the Dominion who are

engaged in the manufacture of cheese, for even after the war is over there is some likelihood of the raw material from which rennet is made being in short supply. Seeing that the manufacture of this constituent in Sweden, and also in Denmark, has to depend largely upon obtaining the calf-stomachs from some parts of Russia, Poland, Austria, and Hungary, a sufficient quantity of rennet may not come forward to meet the demand.

It is therefore easy to realize that New Zealand might be thrown upon her own resources to some extent. It is well known that much of the raw material of rennet in the form of calf-stomachs is wasted in this country. Many thousands of calves are killed almost immediately after calving in Taranaki alone, to say nothing of the many calves destroyed in other dairying districts, and it has been suggested that New Zealand might even produce sufficient rennet to meet her requirements independently of importations. Whether this be so or not it is impossible to say at present. The fact remains, however, that much can be done, if the matter is gone about in the right way, toward furnishing at least a portion of what is needed. The question is of sufficient importance to warrant every dairy company in the Dominion carefully considering the subject, with a view to organizing the collection of the raw material throughout the various dairying districts, say, from the beginning of next season. As upwards of 30,000 gallons of rennet is required for the present output of cheese, the order will be a large one; but unless something is done to provide against disappointment and accompanying heavy loss those concerned will only have themselves to blame should an actual deficiency occur.*

It is admitted that there are some difficulties in the way, and that it might mean the bringing to New Zealand of a specially qualified man to supervise and control the operations. Even at a considerable cost, however, it would pay dairy companies to make the expenditure, for any money spent in this way would be in the nature of an insurance against the shortness of supply. If the matter were thoroughly gone into a solution of the difficulty might easily be found, and I have no doubt that the Department of Agriculture would lend assistance in helping to organize the introduction into New Zealand of what might be called a new industry.

* It should be mentioned that a well-known firm of manufacturing chemists at Dunedin has made several attempts to place locally-made rennet on the market in quantity, but without success, owing to difficulty experienced in obtaining a steady supply of raw material.

CLARIFICATION OF WINES.

A. H. MAZURE.

CONDITION is one of the most important factors in connection with the preparation of wine for the market. Unfortunately, a number of vignerons in New Zealand have evidently not yet realized this fact. Their idea seems to be that as soon as the wine appears to be fairly clear it is good enough for sale. This is a very grave error, inasmuch as the fact has probably not been taken into consideration that such wine is unlikely to improve. The possibilities are, indeed, that the wine will get worse, and it may very probably be returned to the vigneron in worse condition than he originally sent it out. This means loss of trade, and, what is worse, the vigneron's reputation as a purveyor of a reliable article is gone. A little care and judicious treatment of his wine shortly before sending it out, and he will certainly be surprised how quickly his product becomes popular. Vignerons, then, must thoroughly recognize the importance of clarification. No wine whatever should on any account leave a cellar unless it is absolutely brilliant.

Before describing the causes of cloudiness in dry and sweet wines it may be necessary to point out the fact that the addition of the substances to be mentioned are in nearly every case absolutely essential to the clarification of wines. Further, the vigneron may rest assured that these substances are quite uninjurious, and are allowed by all wine-adulteration legislation in the world.

CAUSES OF CLOUDINESS.

Red wine, as the winemaker well knows, is often fairly clear on its first racking, and in nearly every case clears almost completely after a few weeks in the cask. On the other hand, white wine is often months before even showing any sign of losing its cloudy appearance. This cloudiness in white wine is primarily due to the yeast of what is termed a "secondary fermentation." These germs only deposit themselves slowly, because they gradually diminish in size and activity as the medium becomes more and more unfavourable to their development.

Even after these yeasts have deposited themselves the wine is not clear, having often an opalescent cloud. This is due to the presence and physical action of certain albuminous matters in the

must. The reason why this is not the case in red wine is because there is as a rule an excess or an abundance of tannin which is responsible for the precipitation of the albuminous matters contained in that wine.

The average of tannoid matters in red wine is proportionately ten times greater than in white wine. This explains the reason why red wine — providing, of course, that it is perfectly sound — clears so much more easily and rapidly than white wine. It sometimes happens that instead of the cloud diminishing in white wine it increases until it becomes of a very milky appearance. If the wine is shaken up in a glass a swinging cloud will be noticed, and sometimes silky threads are visible. Under the microscope a large quantity of bacteria is noticed more or less closely joined together. These are germs of the most dreaded of wine-diseases — namely, "tourne."

Often a cause of this same cloudiness may be attributed to the bad condition of the grapes through the agency of hail, insects, birds, or perhaps through excessive rainfall at the time of picking.

"Ferric casse" is yet another cause of cloudiness in white wine. This is due to the accidental (?) contact of the wine with a metal. (Vigneron's note: Do not use buckets made from kerosene or benzene tins.) What is formed in this case is an insoluble tannate of iron, and the cloud is slightly blackish, owing to the oxidation of the ferrous salts.

Overfining is still another cause of cloudiness. It is due to repeated or defective finings leaving a certain amount of albuminous matters in the wine. These wines often remain bright in bottle and cask for a fairly long time, but become cloudy with only a few minutes' exposure to the air.

The following processes for clarifying wines are practically the same for the red and white wines—that is, in racking, fining, and, if necessary, filtration.

FINING.

In red wines, as already explained, there is as a rule sufficient tannin to precipitate all albuminous matters, but it is often the case that the wine is not absolutely candle-bright. Provided that the wine is perfectly sound, a light fining will be sufficient to form a precipitate which, on settling, will render that wine brilliant.

In the case of white wine it has been pointed out that there is very rarely sufficient tannin to precipitate all the albuminous matters therein, and it is obvious that tannin must be added in sufficient quantity for this purpose. The question is how much to add. To determine accurately a careful analysis would be necessary,

but for practical purposes the addition of 1 oz. to 1½ oz. of tannin to the 100 gallons should be sufficient. The tannin should be the best procurable.* It should be dissolved in a very little hot water, or preferably in a little alcohol. The following is a good method: Dissolve 1 lb. tannin in 1 quart spirit; ¼ pint of this solution contains 2 oz. of tannin, ⅛ pint contains 1 oz., and so on. Glass measures can be obtained for the purpose of measuring this out. If after fifteen days the wine is not brilliant, a light fining should be added, using ½ oz. of isinglass or 2 oz. of a first-class gelatine. This, of course, is the dose for 100 gallons.

In the case of "tourne"—that is, when the wine appears with a swinging cloud in it or silky threads are noticed—prompt measures must be taken. The wine must be rendered aseptic as quickly as possible. This may be done as follows: Dissolve 4 oz. of potassium bisulphite in a little very hot (not boiling) water. (Do not use a metal utensil for the purpose on any account whatever.) Add this solution to every 100 gallons of wine to be treated. Stir it through the contents of the cask thoroughly. Six hours after add 2 oz. tannin, dissolved as previously described. Then two hours later fine with 1 oz. of isinglass. After fifteen days the wine, if bright, should be racked off, care being taken not to disturb the lees. When the lees are removed from the cask they should be immediately sent to the still. The cask should be thoroughly washed out with boiling water and caustic soda, and, if possible, also steamed.

In connection with the cloudiness caused by "ferric casse," the vigneron must be careful that the wine does not come into contact with any other metal but copper, brass, or gun-metal, and even then not for any more time than can possibly be helped. This cloudiness is fairly easily remedied by a fining, preceded by an addition of tannin, and sufficient aeration to precipitate the tannates. 1 oz. of tannin and ½ oz. of fining per 100 gallons may be used in this instance.

In the case of overfining, tannin must again be added, the wine aerated thoroughly, and then fined lightly, using 1½ oz. tannin and ¾ oz. of fining per 100 gallons. In all cases of fining it must be remembered that a wine must contain an excess of tannin over albuminous matters.

FINING-SUBSTANCES AND THEIR PREPARATION.

White of Egg.—The analysis is—Water, 86·34; albumen, 13; mineral salts, 0·66: 100. The average weight is 1½ oz. White of egg is principally used in red wines, but can also be used with

* Appert's cenotannin is specially recommended for this work.

advantage in white wines. The quantity to be used is from eight to twelve eggs per 100 gallons. In the case of white wines at least ½ oz. of tannin should be added for every six eggs used.

Preparation: Carefully separate the white from the yolk (the yolk must not be used); add half a pint of cold water to every four eggs (hot water would coagulate and cook them); beat up thoroughly; mix with about a gallon of the wine to be fined, and add to the cask, stirring the whole together for at least ten minutes.

It is advisable to rack wine fined in the above manner twenty-one days after fining, for the obvious reason that eggs do not improve on keeping: especially is this so in hot weather.

It may be mentioned here that all finings are albuminous, and albumen is composed of carbon, 53·33; hydrogen, 7·47; oxygen, 15·5; and nitrogen, 23·7 per cent.

Isinglass.—This is undoubtedly and absolutely the best fining that can be obtained. The finest quality comes from the bladder of the sturgeon. The solubility of the material averages from 89 to 98 per cent. at a temperature of about 104° F. It is most readily affected by the tannin of the wine. It leaves less lees and impoverishes less than any other finings, and is therefore specially suitable for light wines. It has, however, one small defect: it tends to leave slight "floaters" or visible spots in wine. This can be easily remedied, however, if it is prepared as under.

Preparation: Soak the isinglass in water overnight. Next morning work it into as smooth a paste as possible, gradually diluting with water at a temperature of 110° F. but not hotter. To this paste add tartaric acid which has been dissolved in an equal quantity of hot water equivalent to one-tenth of the original weight of fining. At the end of an hour or two it will have become a clear jelly. Mix this jelly thoroughly with half a gallon of the wine to be fined. Add to cask, stirring whole for at least ten minutes.

The dose to be used per 100 gallons for a light fining is ½ oz., for a medium fining ¾ oz., and for a heavy fining 1½ oz.

Leaf Gelatine.—This is an excellent fining, and most generally used, as it is considerably cheaper than isinglass. It has an equally good influence on red and white wines, but certainly takes more out of a wine than isinglass, and throws more lees. On account of its purity and tastelessness, however, it can be well recommended for general use.

Preparation: Soak the leaves overnight and pour off the water next morning. This practically eliminates the smell that is noticeable when the gelatine is first put into water. Fresh water is then added, from ten to twenty times the original weight of the finings. Gradually and slowly heat this until the gelatine is com-

pletely dissolved. This must be done in a hot-water bath, so as to prevent the gelatine from burning. Mix with half a gallon of the wine to be fined, and stir as previously mentioned.

PRECIPITATING-POWERS.

The following table shows the coagulating or precipitating power of tannin on the finings above mentioned. One part of tannin will precipitate—

	Parts.
Fresh white of egg	32·00
Isinglass dissolved cold	4·07
,, hot	2·60
Common isinglass	1·04
Best-quality gelatine	1·30
Cake gelatines	0·83 to 0·94

The precipitating-power of the finings used is indicated as follows:—

Ten parts fresh white of egg will precipitate	0·30 parts of tannin.
Ten parts prepared isinglass dissolved in cold water will precipitate	2·68 ,,
Ten parts best-quality gelatine will precipitate	7·68 ,,

From these figures it will be seen that there is a vast difference in the precipitating-power of various finings, and it must be remembered that the higher the precipitating-power the greater the impoverishing result will be. In other words, a fining that requires more tannin to precipitate it will take more out of a wine than one which is more readily affected by the tannin of the wine.

SUNDRY.

Sweet wines as a rule do not require very heavy finings, as the spirit which must be necessarily added to preserve the wine has also power to coagulate albuminous matters. In any case the same quantities may be used as in dry wines. The vigneron after a little practice will soon become accustomed to the use of the various finings mentioned, and he will then be guided a good deal by the state of his wine, and will use his judgment accordingly.

A final word of caution may be given here as regards vessels used in mixing the tannin and the finings. Always use two separate vessels. Care must be taken that on no account the tannin comes into direct contact with the fining, or there will be disastrous results.

A RUAKURA SELECTED WHITE CLOVER.

A. W. GREEN.

WHITE clover is so familiar to all that a description of the plant is here unnecessary. Let us consider for a moment the value of this plant to the farmer. There is little doubt that on account of being common its value is underrated, whereas the opposite should be the case.

In a comparison of merit with other pasture plants white clover stands amongst the foremost. Why? Because it will thrive where other clovers die and where many grasses fail, and, above all, it is preferred by all classes of stock. Many an old pasture would be worthless without this plant. It makes the sward and fills up the patches left bare by the failure of other clovers or grasses. A hot summer may cause its disappearance, but only for a short time. It is one of the first plants to reappear after a drought, and by its stoloniferous habit soon re-establishes itself.

Another point in favour of white clover — and one which is not overlooked by the average farmer—is the manner in which it appears and spreads in a field where it has not been sown. More than one farmer has stated that it is not necessary to sow white clover in a grass mixture, his

SINGLE PLANT OF SELECTED WHITE CLOVER.

reason being that it will introduce itself. This is true to a greater extent than most of us recognize, and this fact alone must add considerably to the value of the plant. To reap where you have not sown is indeed frequently the case with white clover. Few plants other than weeds can claim the same potentiality. Apart from these good agricultural qualities, white clover possesses a value based on the experience of the apiarist. In his estimation no other plant yields a better quality or a greater quantity of honey.

SINGLE PLANT OF WHITE LODINO CLOVER.

After giving all these facts due consideration it occurred to the writer that they warranted an attempt to improve this plant by selection, and that any improvement, however small, would justify the expenditure of time and patience. For several years pastures containing white clovers were searched for plants showing the slightest variation. These were isolated and grown in test plots at Ruakura, each being subjected to similar conditions. As a result, a plant was evolved bearing larger and heavier leaves, with larger flowers carried on long flower-stalks, and distinct in both habit of growth and leaf-coloration. From this single plant, by division of roots, a fair-sized plot has now been established. In addition, sample plots are at present undergoing tests on several departmental farms.

It should be remembered that this clover is only in the experimental stage and is not yet on the market. A large-leaved white clover known as White Lodino clover is on the market, but there is a difficulty in obtaining seed. A plot of this clover is included in the experimental area devoted to grasses and clovers at Ruakura. Although larger and heavier in both leaf and stem than the Selected clover, the latter grows quicker and will cover a given area of ground in much less time. The accompanying

photographs of plants of White Lodino clover and the Selected white clover illustrate this fact. The former plant produces the larger leaf and stem, but the latter provides far more numerous stems, which take root at the nodes, enabling the clover to spread rapidly.

PART OF PLOT OF SELECTED WHITE CLOVER, RUAKURA.

The plot has been propagated from one plant by division of roots.

Cost of grinding Limestone. — A correspondent inquires whether the estimate by Mr. R. W. Holmes, Engineer-in-Chief of the Public Works Department, of the cost of grinding Greymouth limestone, as published in the *Journal* for October last, page 338—viz., 4s. per ton—includes the cost of power as well as interest, depreciation of plant, cost of quarrying, preliminary crushing, and final grinding. In reply it may be stated that the estimate does include the cost of power.—*B. C. Aston.*

LUCERNE IN AUSTRALIA.

T. W. LONSDALE.

LUCERNE has been so much discussed from various points of view during the last few years that one may sometimes begin to doubt whether there is really anything more to be said on the subject. Some fresh points, however, may usually be found in the experience of other countries, and a few notes made by the writer during a visit to Australia some two years ago may be of interest.

The immense advantage of lucerne as compared with many other fodder crops is forcibly demonstrated throughout Queensland, New South Wales, and Victoria. At the time of my visit to those States no rain had fallen over very large areas during the previous eight months; and yet lucerne, although not growing as strong as under New Zealand climatic conditions, was flourishing, while other fodder crops were struggling for existence. Ordinary pastures were parched, and in numerous places many of the grasses were completely killed by the prolonged drought.

On the Darling Downs some thousands of acres are devoted to lucerne, and it is the fodder on which the farmers throughout that district place their reliance. During May the sixth crop was being made into hay. In this district some months later as much as £15 per acre was being paid for the right to graze lucerne for six months, and at the same time in parts of Victoria the rental was equivalent to £34 per acre per annum, specific cases, with names and prices paid, having been reported in the Press. Of course, these enormous values were due to the protracted drought, leaving stockowners no alternative but to pay for the grazing or let their sheep and cattle perish. Thus lucerne proved the salvation of many valuable flocks and herds. Doubtless it is again playing the same part in the severe drought which, unfortunately, is being experienced at the present time in large parts of Australia.

The Hunter River district of New South Wales is truly the home of lucerne in Australia, and all through the Hunter Valley there are beautiful fields of this great fodder. Under normal conditions eight crops per year are cut, and several owners of extensive areas informed me that the yields during a normal season

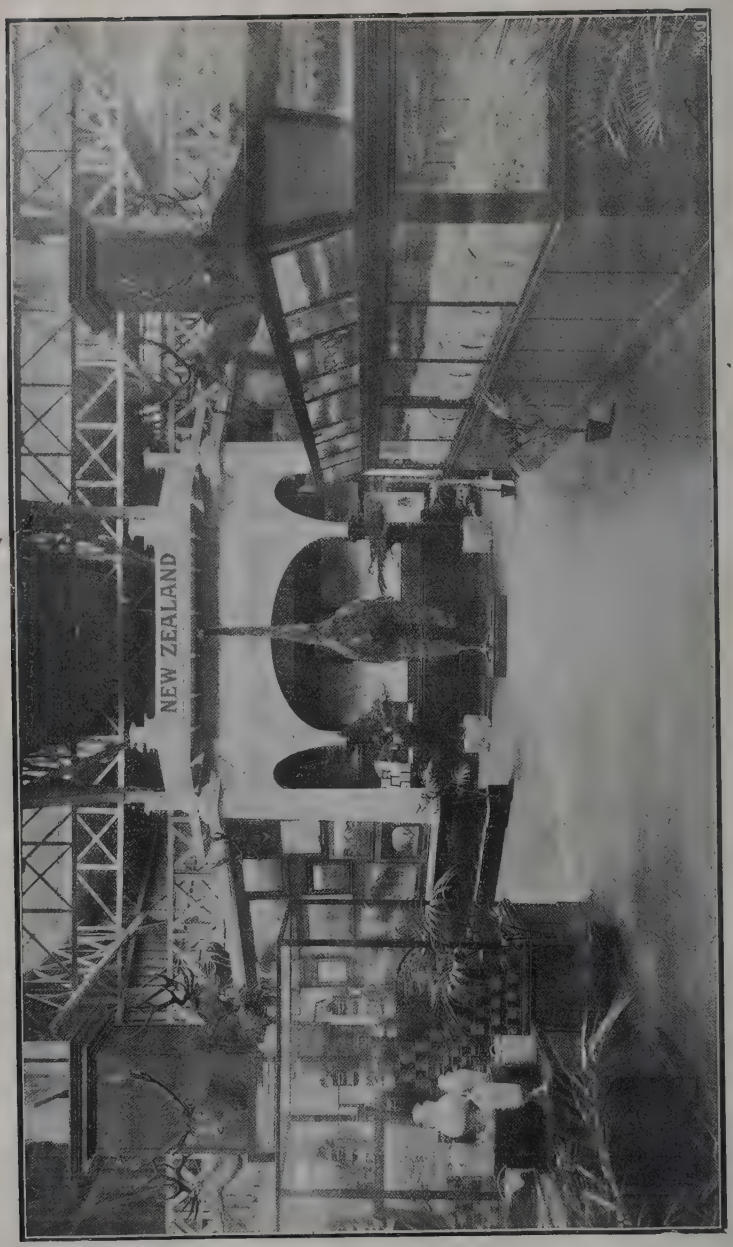
were from 6 to 8 tons of hay per acre. After eight months of extremely dry weather the price per ton was £4 10s., but during a season when the rainfall is satisfactory the price is about £2 10s. per ton. At the Hunter River agricultural show, held at West Maitland, lucerne hay and lucerne chaff form one of the principal sections in the produce department. Separate classes are set aside for sweated hay and chaff, and green hay and chaff; and, judging from the exhibits, the Hunter River growers are adepts at catering for the stockowners.

It is still unknown to what depth the roots of lucerne will penetrate. At places along the Hunter River the land has slipped away; and in one place the roots of lucerne could be clearly traced 50 ft. from the surface, where they disappeared and evidently descended into the river-bed.

In writing of lucerne in Australia it must not be thought that the grower has only drought to contend with. Besides weeds to combat, as in New Zealand, there are formidable pests which at times completely destroy the crop. Foremost amongst these are the grasshopper; also a small fly something like a mosquito, known to the growers as the lucerne-fly. The ravages of these pests are, fortunately, not of very frequent occurrence.

Not only is lucerne available in the dry areas, but where irrigation is practicable it holds premier position among the fodder crops. On such irrigated land it is claimed that as many as eighty dairy cows can be kept throughout the year on 50 acres of lucerne. In addition to the value of lucerne for grazing and fodder, Australia exports annually a large quantity of seed. The bulk of this seed has been of high quality, and it can be recommended for sowing in New Zealand.

Poultry Instructors.—Poultry-keepers are reminded that additional facilities for personal advice or visits to their plants have been afforded by the recent appointment of two Poultry Instructors (Messrs. C. Cussen and A. E. Salisbury) to assist the Chief Poultry Instructor (Mr. F. C. Brown). Mr. Cussen, who was previously Poultry Overseer at Ruakura Farm of Instruction, has his headquarters at Christchurch, and attends specially to South Island work. Mr. Salisbury is stationed at Wellington. Requests for the services of Poultry Instructors should be addressed to the Director of the Live-stock Division, Department of Agriculture, Wellington.



VIEW IN THE NEW ZEALAND COURT, PALACE OF AGRICULTURE, PANAMA PACIFIC EXHIBITION.

MAGNESIA AND PLANT GROWTH.

ANOTHER REASON FOR LIMING SOILS.

B. C. ASTON, F.I.C.

Of the many interesting examples of the composition of the soil influencing the flora growing upon it, perhaps the most striking is that shown by a great excess of magnesium salts.

Magnesium is familiar to most people as the metal from which, on ignition, such a brilliant white light is produced. It does not exist as a metal in nature, but is found usually in the form of carbonate as "magnesite," or in conjunction with limestone as "dolomite," or as silicate, of which serpentine rock is the most familiar example.

Magnesium is present in all fertile soils, and is necessary as a plant-food, being one of the essential elements without which green plants would be unable to complete the cycle of their lives, for chlorophyll (the green colouring-matter of plants) is a compound of magnesium; and if this element be withheld plants become yellow and, of course, ultimately die. Magnesium, like phosphorus, finally moves to the seed of the plants as they develop, but calcium and potassium remain in the leaf or the straw of the plant. Magnesium seems to be necessary to the formation of oil, oily seeds being always richer in magnesium than starchy seeds. It has been observed that algæ growing in solutions free from magnesium salts contain no oil globules.

LIME-MAGNESIA RATIOS IN SOILS.*

The harm done by excess of magnesium salts was discovered by Tenant in the eighteenth century, in studying the ill effects of certain limestones found near Doncaster. Loew (1901) has studied the action of magnesia on plant-growth, and has insisted on the necessity of lime and magnesia existing in the soil in certain ratios, which are essential for obtaining the best results. Thus in the case of cereals the ratio should be 1 : 1, but for other plants, especially those bearing more leaves, the amount of lime should be 2 : 1

* Magnesia is the oxide of the metal magnesium, just as lime is the oxide of the metal calcium.

or 3 : 1. G. Daikahara (1903), with beans in pot experiments, found a ratio of 1 : 1, before the fruiting-stage was reached, the best. F. Goessel (1904), with water cultures, found that 0·4 : 1 was best for beans and barley, instead of 1 : 1 for barley and 3 : 1 for beans, as Loew states. Goessel concluded that a definite relation was unnecessary. Then four other Japanese entered the field. T. Nakamura (1905), in pot experiments on barley with a soil containing seventeen times as much lime as magnesia soluble in strong hydrochloric acid, adding sulphate of magnesia in different proportions, found that the lime-magnesia ratio of 2 : 1 gave the best results. S. Maki and S. Tanaka (1906) found, in pot experiments with barley, that only one-twentieth as much magnesia (MgO) in sulphate as in magnesite (carbonate of magnesia) is needed to bring about favourable conditions in an overlimed soil. S. Namikawa (1906), with flax and spinach, obtained the best results by using the ratio 1 : 1.

Dr. J. A. Voelcker (1906) pointed out that, interesting as these Japanese pot results were, they should be confirmed by field-work. Loew the same year pointed out that magnesium carbonate is the least injurious form of magnesium in soils, and also the importance of applying magnesia in some cases of excessive lime in soils.

R. de Wildt (1906) critically reviewed the investigations, and concluded that though definite relations may exist between lime and magnesia for the normal nutrition of plants, investigators had not yet proved it.

I. Konovalov (1907), a Russian, with oats and millet in water cultures found that, using magnesium sulphate, the best yield was obtained with the ratio 6·7 : 1 (CaO : MgO), with barley 3·3 : 1, and with maize 0·8 : 1. For the development of roots only of barley the best ratios were 6·7 : 1, 13·3 : 1, and for maize-roots 3·3 : 1.

L. Bernardini and G. Corso (1907) have published in Italy the results of their studies — using lime and magnesia in varying proportions on a considerable number of plants in field, pot, and water cultures. They confirm the conclusions of Loew and various Japanese investigators with cereals such as wheat, rye, oats, rice, and barley, and find a ratio of 1 : 1 gives the best results for spinach and maize, 2 : 1 for flax and cabbage, and 3 : 1 for leguminous plants.

K. Aso (1909) asserted that any change in the ratio 1 : 1 leads to a decrease of the harvest of rice. He maintains the existence of a certain favourable ratio of lime to magnesia, even in sand cultures. Absolute excess of lime or magnesia, provided it be kept within certain limits, has no outstanding influence on plant-growth,

the ratio between these bases being the important factor. For mulberry-trees from 2 : 1 to 3 : 1 was the best ratio.

The Rothamsted experimenters (A. D. Hall and E. J. Russell, 1911), in dealing with soils containing 0·1 to 0·5 per cent. of magnesia (MgO), having a lime-magnesia ratio of from unity (1 : 1) up to 1 : 4·1 (barren wastes), from 1 : 1·9 to 4·1 (poor cultivated lands), 1 : 1·4 to 5·4 (fertile soils), are negative in their pronouncements on the ratio question. They were unable to trace any connection between the lime-magnesia ratio and the productiveness

MAGNESIA-POISONED SOIL, DUN MOUNTAIN, NELSON.

Showing where the beech forest ends and the barren soil begins. Samples E/207, 7–8, were collected here. (See page 501.)

of the soil. Indeed, their results show that very good and very poor soils may have practically identical ratios.

Lemmermann and others (1911) experimented with cereals, mustard, buckwheat, and legumes on six different soil types, using eight different crops. The yields were not notably affected by variation in the lime-magnesia ratios within wide limits. The addition of lime and magnesia was without influence to soils containing only 0·08 per cent. of lime and 0·04 per cent. of magnesia, or 0·067 per cent. of lime and 0·09 per cent. of magnesia. They emphasize the necessity of considering the ratio in which lime and

magnesia are dissolved by carbonic-acid waters, which extract these compounds in a different ratio to that in which they exist in the soil, more lime than magnesia being dissolved by weak acid solvents, a fact that I had already pointed out in 1908 (see Annual Report, New Zealand Department of Agriculture, 1908, pp. 255 and 265, with regard to water and weak acid solutions). These authors conclude that neither for bacteria nor for higher plants could any distinct relation of lime to magnesia be established as being particularly favourable.

R. Stewart (1911) experimented on the farm of the Utah Experiment Station, where the soil contains 40 per cent. of carbonate of lime and magnesia (of which one-third is magnesium carbonates), well supplied with phosphoric acid, but low in nitrogen and humus. The soil is remarkably fertile, the average yields for eight years being—oats, 82 bushels; wheat, 50·4 bushels; potatoes, 262·3 bushels; sugar-beet, 21·8 tons. The practice is not to manure at all for the first three crops, and to give barnyard manure for sugar-beet. The author suggests that the absence of injurious effects from the magnesium carbonate may be that the ratio of lime to magnesia falls within the limits prescribed by Loew, or that the lime and magnesium carbonates are combined as a double salt.

Warthiadi (1911) by sand and water cultures with rye, wheat, barley, &c., found a ratio of 1:1 gave the best results in sand cultures, and by varying the ratio obtained a decrease of from 40 to 60 per cent. in the produce.

E. J. Russell (1912) states that although cases where excess of magnesia in the soil has caused infertility were reported by Loew, none has fallen under his (Russell's) observations in England. He states that any injurious effect can be overcome by treatment with lime.

J. A. Voelcker (1914), at the Woburn Experimental Station, records a series of pot experiments, using a Herefordshire soil having a lime-magnesia ratio of 0·85 : 2·29. Lime was added in varying proportions up to twice the amount of magnesia, each addition giving a higher yield until the lime was twice the amount of the magnesia. Dr. Voelcker in his report concludes, "It is clear that the addition of lime to a soil rich in magnesia is beneficial and can be applied without detriment even to an extent where the lime is double the amount of the magnesia; whereas from previous experiments (1913 report) it has been shown that the addition of magnesia in excess would, on the contrary, have a deleterious effect."

Meyer (1912) published his disbelief in the ratio theory, and quotes evidence to show that the maximum yield is not dependent on any fixed ratio of lime to magnesia.

P. L. Gile and C. N. Ageton (1912), of Porto Rico Experiment Station, from their observations that soils with exceedingly wide ratios are exceptionally fertile, conclude that for ordinary soils the analysis of lime and magnesia ratio is of no significance, but in the analysis of soluble salts of alkali soils the lime-magnesia ratio may be exceedingly important. Only one kind of crop (rice) was used,

DUN MOUNTAIN, NELSON.

This photograph shows where the manuka ends and the flax (*Phormium*) begins, near the foreground in previous view.

and chlorides of calcium and magnesium were the salts used in water cultures.

E. Haselhoff (1914) in pot experiments with different crops obtained results which do not substantiate Loew's theory.

Loew from time to time replied vigorously to all his critics, and after fourteen years of controversy, begun in Japan and continued in America, the final word is with him, "Die Lehre von Kalkfaktor," Berlin, 1914, and there we leave him.

Kearney and Cameron, in America, with water cultures have shown that salts of magnesia possess, even in solutions of great dilution, a

toxic action upon plant-roots, which is much diminished if calcium salts be present at the same time.

There can be no doubt that a large excess of magnesium compounds in the soil has an injurious effect on plant-growth which is corrected by the addition of enough lime. Neither can it be doubted that magnesium is necessary to plant-life. It seems logical, therefore, to postulate for plant-life the possibility of an optimum lime-magnesia ratio which might vary with varying crops and soils.

I am not able to advance the ratio question much, and it is only noticed here to introduce the subject of the injurious action of magnesia compounds on some New Zealand soils—approaching the problem in the historical method.

NEW ZEALAND EXPERIMENTS.

In 1906 I was consulted by a settler in Nelson Province, thirty-two miles inland, with regard to his land, of which he owned 1,500 acres, 700 acres being manuka (*Leptospermum*) scrub country. A persistent local tradition existed that this soil would not grow crops, the explanation advanced being that a poisonous wash comes down from the hills, making the ground useless for cropping. My informant, who had just ploughed 16 acres on trial, reported that the land looked really good, being a light but deep river deposit without a stone. He stated that by dispelling the above fallacy by publishing a method of combating the trouble the Department would be helping to bring into cultivation a large area of this country in the Upper Motueka Valley. A neighbour had told him that he had tried similar land further up the valley, on which oats grew 6 in. high and then died off, and that turnips grew only as large as small marbles. A sample of soil from the 16-acre paddock, taken from different parts 2 chains apart, was received. This sample was a fine sandy river deposit with green particles through it, the paddock from which it was taken showing, where a mill-race had been cut, 10 ft. in depth of similar material. This sample (H/1091) was analysed and reported upon in May, 1907. It was well supplied with the plant-foods—available potash, phosphoric acid, and total nitrogen—but contained 10·8 per cent. of magnesia and only 1·08 per cent. of lime soluble in strong hydrochloric acid, the amount of magnesia being ten times the quantity of lime. I reported that it was extremely probable that the sterility of the soil was due to the excess of magnesia, and recommended applications of lime as a remedy, calcium sulphate being also suggested.

Liming this soil resulted in the owner subsequently reaping a normal crop of oats.

A farmer who owned the adjoining property to this then entered into correspondence with me with regard to his soil, which he complained was infertile. Oats came up and died in a few weeks; potatoes did best, manuka and sorrel being the only growth which thrived. Some partridge peas sown were only 3 in. high and dying, when on another piece of ground alongside they were 1 ft. or more in height, all the crop having been manured alike with 2 cwt. of blood and bonedust and superphosphate. The treatment of

GENERAL VIEW LOOKING OUT OF THE FOREST TO THE BARREN DUN MOUNTAIN HILLS IN THE DISTANCE.

the land was the same, except that the turf had been mixed with the soil where the peas grew highest, and had been removed where they died. This suggests the use of green manure as a possible treatment. Analysis showed that this soil (K/578), like the previous one, was a fine sandy soil with green particles, well supplied with plant-food, and also, like the first one, contained a large amount of magnesia soluble in hydrochloric acid; but the amount of lime was larger than in the previous sample, magnesia being present in quantity only five times as great instead of ten times. One per cent. citric acid was now for the first time used, and extracted two and a

half times as much magnesia as lime. In this case the reaction of the soil was alkaline, a condition favouring the toxic action of magnesia. The same advice was given in this case. In addition to the analysis, pot experiments were carried out, an account of which is given in the Department's Annual Report for 1909, p. 446.

At the Wangapeka Settlement, some twenty miles further up the valley, another group of settlers had complained that their lands did not respond to the usual treatment. Soils from this area were analysed, and a series of pot and field experiments were initiated. The pot experiments gave very interesting interim results, indicating the necessity of liming the Wangapeka lands in order to obtain the best results in cropping. It is to be regretted that as the pot experiments were in progress retrenchment became the order of the day, and they were discontinued. Particulars, so far as available, were given in my 1908 report (see Annual Report of the Department for 1908, p. 266). A composite sample of soil from the district was extracted by hydrochloric acid of varying strengths, with the following results:—

Hydrochloric Acid. Per Cent.	Lime. Per Cent.	Magnesia. Per Cent.	Ratio Lime : Magnesia.
5	0·075	0·032	1 : 0·43
10	0·084	0·044	1 : 0·53
Strong	0·200	0·350	1 : 1·7

Some soils have been analysed from still higher up the valley, in the Sherry River district, but these proved to contain more lime than magnesia.

DUN MOUNTAIN SOILS.

The most striking example of the infertility of a soil caused by excess of magnesia is that afforded by the Dun Mountain. Travellers visiting Nelson by boat must be puzzled to account for the fact that behind the city a great, almost square-topped mountain stands out by reason of its sterile appearance from among those surrounding and overtopping it. The other mountains are forest-clad and green to their summits, while the Dun Mountain, as its name implies, is dark brown, and supports but a scanty covering of scrub. The mountain has been well described in its geological and botanical features in Bulletin No. 12 of the Geological Survey, but the soil-conditions have not been touched upon, except to characterize it as a dry soil. If this statement is literally accurate, the dryness must be due to the absence of plant-life or to the peculiar texture of the soil on this mountain, for the rainfall must be the same as on the other mountains in the vicinity. It will be seen that the samples taken

by me were well supplied with moisture. The absence of plant-life on the worst soils is most remarkable. As one steps out of the forest the change in flora is immediate and striking, as shown in the accompanying photograph.

I visited the mountain expressly to study the magnesia-content of the soil, in company with Mr. F. G. Gibbs, in 1913, walking along the Dun Mountain tramway right over the so-called "mineral belt." A sample of soil (D/1024) was collected on a barren spot at the further side of the mountain.

I again visited the mountain in 1914 and took photos at the edge of the belt, where I considered the good soil ended and the barren soil commenced, samples being taken a few chains from each other. One sample (E/207–8) was taken in the forest, the other (E/207–7) in the scrub. D/1024 may be regarded as the extreme type of bad magnesia-poisoned soil, bare of all higher plant-life, E/207–7 as intermediate, and E/207–8 as capable of supporting forest.

ANALYSES OF DUN MOUNTAIN SOILS.

	D/1024.	E/207–7.	E/207–8.
Moisture	9·90	21·28	20·14
Organic matter and combined water	13·91	12·38	16·46
Nitrogen	0·19	0·167	0·023
Hydrochloric-acid extract:—			
Potash (K_2O)	0·04	0·04	0·13
Phosphoric acid (P_2O_5)	0·009	0·04	0·05
Lime (CaO)	4·70	2·91	3·68
Magnesia (MgO)	15·33	13·86	2·14
Citric-acid extract:—			
Potash (K_2O)	0·002	0·010	0·030
Phosphoric acid (P_2O_5)	Trace	0·003	0·004
Lime (CaO)	0·083	0·10	0·11
Magnesia (MgO)	0·303	0·25	0·05

NOTE.—Results, except the first, are percentages calculated on the soil dried at 100° C.

SUMMARY.

If in a soil the amount of magnesia exceeds that of the lime, judged by means of a strong solution of hydrochloric acid, and such excess be deemed to be injurious, a great number of New Zealand soils, according to analytical records, stand in immediate need of some form of lime from this cause alone.

Instances are somewhat remarkable, and lend themselves to rough geographical classification, such as the country of the Manawatu railway-line; Wairarapa railway-line; pakihis of Westland; Nelson; Puketoi Range (Pongaroa, Makuri, &c.); Marlborough; many limestone-derived soils; country adjacent to the sea littoral where quantities of sea spray containing magnesium salts are blown ashore,

as at Ohau Bay and Whangaroa; soils derived from mica-schist rocks; Catlin's River, Otago; and many Canterbury soils.

If the excess be judged by a weak acid solution, the number of known soils with an injurious amount of magnesium in them becomes narrowed down to a few localities in the Nelson Province. The record of analysis is, however, fragmentary. One would expect that where soils are derived from rocks containing a large amount of magnesia it would be present in those soils in injurious excess. The preponderance of magnesia in some sea-littoral lands is interesting as pointing to the excess being derived from the sea.

As to the remedy for excessive magnesia in the soil, theory, supported by a certain number of pot experiments, indicates that in extreme cases land-plaster (gypsum or sulphate of lime) or larger dressings of ground limestone (carbonate of lime) should be applied. An observation by a Nelson settler suggests green-manuring as a remedy which might be also tried. Our lack of absolute knowledge on the subject only emphasizes the need for more systematic and correlated work in field, greenhouse, and laboratory.

In a future issue the lime-magnesia content of New Zealand soils will be further gone into.

EARLY AND LATE VARIETIES OF VEGETABLES.

W. H. TAYLOR.

JUDGING from the difficulties of several correspondents, there appears to be a good deal of misunderstanding as to what constitutes early and late varieties of vegetables, and the purpose they are intended to serve. In some instances early varieties are small species of a family; in all cases they are varieties that mature quickly. Late varieties, except in a few instances, are those that are a long time coming to maturity, and only rarely is a variety late because of possessing special powers of developing in a low temperature. So far as I know, this latter trait is confined to several varieties of peas—dwarf varieties that produce peas later than other varieties.

In order to successfully manage a vegetable-garden it is necessary to understand the principles which regulate growth, and more particularly is this the case because it is at times necessary to meet urgent cases. Many circumstances may arise to drive the operator from the beaten track of common usage, and a little error

in judgment may in such cases nullify the best efforts. Take the case of broccoli. This family is divided into early, mid-season, and late varieties. In this case the factor that makes the difference is the time the different varieties take to produce heads. Seed of all the sections should be sown in September or October. The earlies will begin to head probably in June, mid-season in August and September, and late in October and November. Broccoli can be, and are, sown much later, but only in an emergency by those who know what they are doing. In ordinary practice the heads would not be wanted after the months mentioned, because ordinary routine would provide cauliflowers. The broccoli would have no value unless they were available before cauliflowers could be got.

Now, suppose (and this is a real case) that the end of summer found the provision made for broccoli insufficient, ground not having been available before then. The plants should have all been out before January has ended—a little difference being allowed in different parts of the Dominion—but it was well into February before ground could be found for the crop. Though some measure of success might still be attained, it could only be by making an early variety do the duty of a late. The reason is plain: the early varieties mature in the shortest time. It is a singular fact that broccoli planted too late may grow fairly well but not make heads at the proper time, continuing to grow till the following winter, and then, after perhaps eighteen months, give heads of some sort, usually only indifferent ones. Even an early variety planted late, though it would almost surely give heads, would just as surely be far from first class. The moral is there is no time so good as the right time.

If one variety is longer reaching maturity than another it is evident that if they started together they would not be in use together. This fact supplies the reason for sowing early and second-early peas on the same day, and for sowing and planting early and main-crop cauliflowers at the same time. The early variety comes quickly into use, and by the time it is past, or nearly so, the later variety is ready.

The above remarks in regard to broccoli may give rise to the thought that so many varieties are not necessary, and that one variety sown at different times would suffice. This argument is wrong, because some would be planted too late to make good growth. It is necessary to get good growth in late summer and early autumn, then it is continued later; with late planting satisfactory growth would be wanting. Hence the value of true late varieties: they grow on without heading until the proper time arrives.

DYING OF YOUNG FRUIT-TREES.

A. H. COCKAYNE.

DURING the past few months a very serious mortality amongst young fruit-trees has been experienced in many of the fruitgrowing sections of the Dominion. These losses have been especially severe in young orchards where the trees are from four to eight years of age, and has been notably serious to certain varieties of apples, although the disease has not been confined to that description of fruit-tree, pears, apricots, and plums having also been affected.

APPEARANCE OF DISEASED TREES.

The appearance of diseased trees is very characteristic, and affected specimens, when once they have reached a certain stage, can be immediately detected. So far as apple-trees are concerned, the first outward sign of disease is manifested by the wilting of the buds in the early spring. In certain cases the buds themselves have not expanded at the normal time, and affected branches have gradually died without any attempt having been made to develop any spring growth. In the majority of cases, however, the buds have developed, and a weak growth has been produced which is followed by the rapid wilting of the young growth.

If a branch in this condition is examined and the bark cut through, a browning of the inner layers of the bark and cambium* is plainly visible. This browning and death of the living elements of the branch extends with great rapidity, and apparently always spreads downwards. Finally, in cases of severe attack the complete death of the tree occurs within a few months after the first outward manifestation is noticed. In many cases, however, the complete death of the tree is delayed, and only individual branches die out in the first season following the wilting of the young growth. Where the attack is a severe one the browning and discoloration of the living portions of the bark is rapidly followed by a souring of the sap, and the term "sour-sap" has been applied to the disease by certain orchardists. When once this sour-sap stage has been reached it is found that the whole of the cambium is disintegrated and dead, and the tree then invariably succumbs sooner or later. In certain instances the souring of the sap does not seem

* The cambium is that actively dividing layer of cells that lies between the bark and the wood. Its importance lies in the fact that all new tissues are derived from this formative substance.

to develop in the earlier stages, and in such cases the bark assumes a cracked appearance, and cankered spots are developed. This is not followed by the immediate death of the branch, but all the young growth rapidly dies out.

FRUIT-TREES AFFECTED.

A great many different kinds of fruit-trees appear susceptible to attack, and, as already indicated, the disease has been noted on apples, pears, plums, apricots, and nectarines. Until this season no particular attention has been given to this disease, as, although the dying of young fruit-trees has not been unusual, the cause has generally been attributed to some unfavourable soil-condition, such as defective drainage. Recent work that has been carried out, however, shows definitely that a fungus is primarily the cause, although unfavourable soil and climatic conditions may have a great influence on the ability of the fungus to cause infection. Thus, as the disease has not been thoroughly investigated, it is impossible to say what fruit-trees may or may not be liable to attack. In one district it has been ascertained that, so far as apples are concerned, certain varieties only have been attacked. These varieties are Cox's Orange Pippin, Sturmer, Delicious, and King David. It is, however, more than probable that further investigation will considerably extend this list; but the complete immunity of certain varieties, such as Jonathan, in orchards where the other varieties are seriously affected is a point of the highest significance.

THE CAUSE OF THE DISEASE.

An examination of affected specimens has shown that wherever any discoloration of the bark is present large quantities of the mycelium of a fungus can be demonstrated. Not only do the fungal filaments permeate the bark and cambium, but they also enter the medullary rays of the wood and partly fill the vessels. It is this blocking of the water-conducting system of the plant that causes the sudden wilting of affected branches. In the specimens recently examined a considerable amount of fungal fructifications have been found on the outside of the affected bark, but it is not yet known whether these spore-bearing receptacles are connected with the internally developed mycelium or not. From the general appearance of affected plants the disease apparently closely resembles that caused by *Valsa prunastri*, a fungus that in Europe is held responsible for a serious disease of young fruit-trees. This disease has been found on certain apple specimens during the past year, but the spores produced did not resemble those formed on the affected material under discussion. There is,

however, a probability that the typical *Valsa* spores may be developed later and that the disease may be caused by that organism. Again, in certain of the specimens the fruiting-bodies of another fungus, known as coral-spot (*Nectria cinnabarina*), have been found, and the disease may turn out to be caused by that fungus. Until, however, the actual fruiting of the internal mycelium has been secured it is impossible to say what particular fungus is the cause of the trouble. A full investigation of the disease is in hand, and the actual species responsible will, no doubt, be determined shortly. The important point that has been reached in the investigation so far is the fact that the disease is not actually caused by unfavourable soil or climatic conditions, although these may play an important part in the rapid spread of the affection.

SUGGESTED METHODS OF CONTROL.

There seems little doubt that the organism responsible for the disease is a wound parasite, or, in other words, that infection takes place through wounded, cut, or injured surfaces. A modern-pruned fruit-tree always offers numerous wounded surfaces providing excellent opportunities for the development of wound parasites. If it were known at what period of the year the spores are capable of causing infection it is probable that the application of a protective spray would be a feasible method of control. The permanent protection of wounded surfaces in an orchard of any size is, however, quite out of the question, and if the fungus produces spores capable of infection throughout the year spraying would not be of any practical utility.

At the present time the only feasible method of combating the disease is to remove and burn the whole of the affected trees. Where the disease is confined to individual branches their removal may be sufficient to save the tree; but in every case the cut branches should be burnt, and on no account be allowed to lie about the orchard. It has been noted that until the whole of the scion has become affected the stock remains quite healthy. This is an indication that the disease spreads from above downwards, so that if the cutting-back is done in time the tree may be re-grafted with safety. This drastic method of cutting out all affected wood, and at times the total removal of the trees, is not one that will appeal to orchardists, especially when the affected trees have reached the stage of bearing. It, however, must be recognized that this disease, by killing the cambium and blocking up the water-conducting system of the tree, is certain to cause its death sooner or later. Thus in all cases where the whole of the tree is affected its speedy removal from the orchard is a necessary procedure.

CERTIFICATE-OF-RECORD DAIRY COWS.

W. M. SINGLETON.

A FEW records have been completed since the compilation of the list published in last month's *Journal*. These latest records, as appended, include some of outstanding merit.

Illustrations are given of three cows to which reference was made in the notes accompanying last month's list. Each of these

GRACE FAYNE OF ASHLYNN.

Owned by C. A. Hopping, Palmerston North. Days in milk, 351. Pounds milk, 17,934·0. Pounds fat, 716·05 Age, 4 years 302 days. Standard, 343·7 lb. fat.

cows has a record which stands high amongst those which have been made in New Zealand by individuals of the respective breeds, and the performance of the Jersey heifer Twylish's Maid of All Work is especially creditable. This is a young cow purchased by Messrs. Wren Bros. from the breeder, Mr. H. E. B. Watson, of Tai Tapu. Through her sire this cow is a half-sister of Twylish's Solid Gold, which cow has a certificate of record for 566·64 lb. fat, made at the age of 3 years 11 days.

FRIESIANS.

Referring to the current list, Mr. G. Aitchison's Corona has the best record for the month, and this well sustains the Cordyline standard. Two names appear in the class for senior three-year-olds. Of these, Pietertje Lassie of Cliffside has added to her laurels by producing a second large record. Her record on her previous calving almost reached 600 lb. of fat. In 2 years 2 months and 4 days this young cow has produced three calves and over 1,114 lb. butter-fat.

Dominion Mutual Mercedes of Rock, at the Weraroa Experimental Farm, has also done good work. She did not milk the full year, and during her lactation period was milked only twice a day. This is the third lactation period during which we have tested this cow. As a junior two-year-old she produced 373 lb. fat in 362 days, while during the following lactation as a junior three-year-old her yield was 414 lb. fat in 336 days. Her third yearly record, which we now publish, evidences very consistent work of high quality from year to year.

JERSEYS.

The two-year-old class of Jerseys contains some very good figures, though no records are broken. Mr. John Nicholson's Lady Binnie, in her first lactation season, has a production that does her credit. Famous, owned by Mr. D. H. Kilgour, has also exceeded the 400 lb. fat mark, but although she has produced more than Lady Binnie the margin above her requirement is scarcely as great.

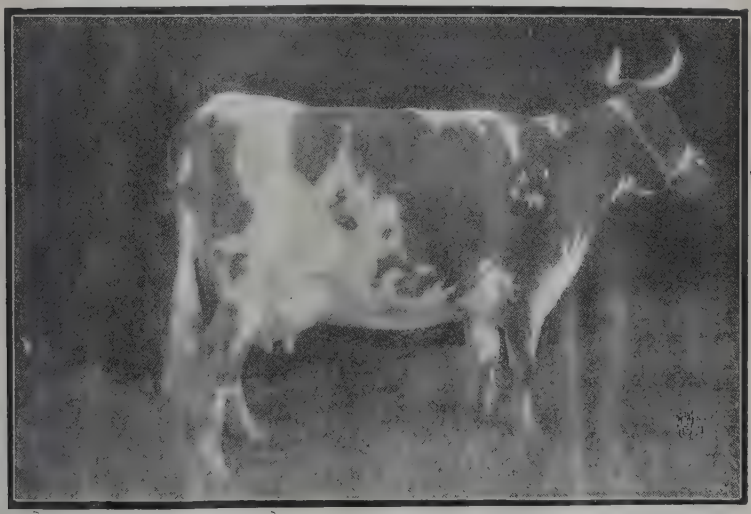
In the four-year-old and mature classes the Curtis Estate, Inglewood, has the only representatives. The records for the four cows evidence good work from this herd. Madam May Queen exceeded the 500 lb. fat mark, while two others are between 450 lb. and 500 lb. These cows are all on the farm that was the home of Madam May Flower, which cow still holds the highest certificate of record for butter-fat production for her breed in New Zealand.

AYRSHIRES.

Cole's Fancy adds another to the list of C.O.R. daughters of King Cole, the only Ayrshire bull that has yet qualified for our special class through his tested daughters. This record of over 500 lb. butter-fat places Cole's Fancy as third highest record Ayrshire. In the mature class she supersedes Bonny of Townhead, reported last month, and is second only to her half-sister Minnie of Glenweir.

TWYLISH'S MAID OF ALL WORK.

Owned by Wren Bros., Takaora. Days in milk, 365. Pounds milk, 10,617·4. Pounds fat, 600·45. Age, 3 years 301 days. Standard, 307·1 lb. fat.



BONNY OF TOWNHEAD.

Owned by F. Mills, Hawera. Days in milk, 365. Pounds milk, 12,833·2. Pounds fat, 496·62. Age, 6 years 304 days. Standard, 350 lb. fat.

LIST OF RECORDS.

Name of Cow.	Name and Address of Owner.	Age at starting Test.	Fat req'd. for Cert.	Yield for Season.		
				Days.	Milk.	Fat
	JERSEYS.					
Two-year-old Class.		Yrs. dys.			lb.	lb.
Silverlock's Sweetbrier	H. H. Phillips, Te Rehunga	1 324	240·5	365	4534·6	263·18
Lady Binnie ..	J. Nicolson, Hawera..	2 25	243·0	365	7758·3	437·63
Oaklea's Maid ..	E. O'Sullivan, Cardiff, Taranaki	2 25	243·0	365	6781·4	375·73
Sweetheart of Bull's..	Dr. F. J. Watson, Bull's	2 29	243·4	365	4375·8	291·87
Famous	D. H. Kilgour, Kiwitea	2 281	268·6	365	9388·8	446·08
Three-year-old Class.						
Sybil See	A. Banks and Son, Kiwitea	3 308	307·8	350	7632·5	374·75
Four-year-old Class.						
Pretty Flower ..	Curtis Estate, Inglewood	4 52	318·7	365	8531·5	482·15
Grandee	Ditto	4 52	318·7	365	7868·6	451·61
Mature Class.						
Madam's Ladybird ..	Curtis Estate, Inglewood	5 2	350·0	365	7536·6	441·76
Madam May Queen..	Ditto	5 230	350·0	365	9351·2	504·24
	FRIESIANS.					
Junior Two-year-old Class.						
Longbeach Michaelmas Daisy	Barrow Bros. and Ellis, Kiwitea	1 354	240·5	333	7732·5	305·29
Countess Viola Burke de Kol	J. H. Parkinson, Opotiki	2 82	248·7	365	8171·9	309·77
Senior Two-year-old Class.						
Corona	G. Aitchison, Kaitangata	2 335	274·0	365	17967·25	626·50
Senior Three-year-old Class.						
Pietertje Lassie of Cliffside	W. I. Lovelock, Palmerston North	3 329	309·9	365	13906·6	517·31
D. Mutual Mercedes of Rock	Weraroa Experimental Farm, Levin	3 348	311·8	356	12628·75	427·19
Mature Class.						
Magnet	Moody Bros., Opotiki	Mature	350·0	313	9840·4	350·07
	AYRSHIRES.					
Four-year-old Class.						
White Topsy of Cambridge	Watt Bros., Cambridge	4 33	316·8	363	8362·0	330·97
Mature Class.						
Cole's Fancy ..	Weir Bros., Pukehiki, Dunedin	7 6	350·0	365	12230·1	514·87

WORK FOR THE COMING MONTH.

NEW ZEALAND is a country of wide variation in climatic and soil conditions. In applying suggested procedure it is, therefore, necessary for the farmer to amend it to suit local weather-conditions and the requirements of his soil—information which can best be ascertained by a study of these problems on the part of the farmer himself. Nothing can take the place of local knowledge. Little advice on an agricultural subject is capable of general application in its entirety.

THE FARM.

THE main crops of the year are now well under way. On the well-conducted farm, however, there should be no surcease from activities. Drilled crops call for constant scarifying not only to cut out seedling weeds, but to keep in moisture and send the crops along.

On the heavy lands paddocks in forage crops fed off during the winter have in many cases not been in condition for grassing, and are being reserved for grass-sowing in March. These call for immediate attention. With the treading of stock the ploughing has left the surface very open and lumpy, and the conditions are generally favourable to rapid escape of moisture should dry weather ensue. The roller, disks, tine harrows, and finally the cultivator and harrows, should be successively used, after which the land may be left until hay and grain harvests are over.

Consideration should be given to forage crops for winter and spring use, and a piece of old grass land fixed upon for this purpose. Towards the end of the month this ground should be heavily stocked and eaten bare preparatory to ploughing.

After early cereal crops have been removed stubbles may be harrowed to spring surface weeds, and thereafter disked and harrowed for catch-crops. If seeding-conditions are favourable a start may be made with sowing these crops. A mixture of 1½ bushels of Cape barley and 1 bushel of tares has been frequently recommended. Another good stubble seeding is Western Wolths rye-grass 18 lb., cow-grass 8 lb., and crimson clover 1 lb. For strict green-manuring of impoverished land 10 lb. mustard may be used.

Maize may be sown up to the end of December in most districts, and where it has already been planted a further planting may be made to provide succession of feed.

On the heavier types of soil lucerne may be sown in January if conditions are favourable. If the land has been deeply ploughed and well worked previously, all that is necessary before sowing is to cultivate and harrow thoroughly. Drill in 10 lb. of seed, running it through every coulter, and broadcast a further 5 lb. per acre in counter direction to the drilling. Thus the ground is well covered and weeds have less foothold.

Thistles and other undesirable growths in the grass-paddocks must be dealt with immediately. In the press of work they have generally been allowed to flourish. It is no uncommon thing to see paddocks reduced in their grazing-area by one-third which is occupied by Scotch thistles.

The next best course to overhauling the binder immediately after harvest, and before carefully housing it until another season's use of it is due, is to take it in hand well before cereal crops are due for cutting. Thus at least delays and bad work can be avoided when the press of harvesting is on. Examine thoroughly for broken parts and have these replaced; clean out all oil-holes with wire picker; give all bearings a preliminary oiling so as to give the oil time to work in; sharpen knives and replace broken sections. Canvases require attention; see that straps, buckles, and slats are in order, and replace where required. The canvases themselves should be carefully repaired; but even sound good canvases will run to corners and tear if the frames are not square. To true-up the frame, place against it the long end of a square, and the other end against the roller. Correct any divergence by screwing up the truss-rods. Replace broken slats on the reel, and see that each slat is parallel with the knife-board.

The time is at hand in the North for mating-up the rams with the ewes for early lambs, and the general mating shortly thereafter must be kept in view. With the great growth of feed now general throughout the North Island the rams are apt to be in soft condition. Consideration of a good lambing percentage, therefore, points to the advisability of getting the rams on to short pasture and making them an allowance of some crushed oats. For the same reason an extra ram or two held back from the flock and put amongst the ewes several weeks subsequent to the general mating is good policy.

The season's drop of calves is now being gradually weaned. Where the calves have been properly treated in the matter of pail-feeding before weaning they should be in good shape, and it

is therefore the more desirable that they should not suffer a check at weaning. Grass and clover are all right, but a small allowance of crushed oats in addition is better. It is generally agreed that there is scarcely anything to surpass even quite a small allowance of oats for young stock. Whey-fed calves in particular are not beyond redemption if the oatmeal, and subsequently the crushed-oats ration, is kept up. Many farmers are again attempting to raise calves on separated whey and grass alone. The dairy-farmer is wise who ignores reports of successful calf-rearing by this system.

With the continued wet weather in the North, and consequent prolongation of tillage operations, teams generally are somewhat low in condition; and as there is not going to be much opportunity to spell them before harvest, the wise farmer will realize the necessity of liberal feeding with good oaten chaff supplemented by a proportion of straight oats.

THE ORCHARD.

J. A. CAMPBELL.

WET WEATHER AND BLACK-SPOT.

UP to the time of writing the weather-conditions in the greater part of the Dominion have been the reverse of dry, and such conditions are not favourable to fruitgrowing. Soft watery growths and improperly matured fruit are two of the objectionable features which invariably follow excessive wet, in addition to which the ideal conditions for the development and spread of fungus diseases are sooner or later bound to exist. The outbreaks of such fungus diseases in the form of black-spot, mildew, and Irish blight have unfortunately been prominent features during the early part of this season. The hot dry weather experienced in many fruit-growing districts during the past few seasons was not favourable to the development of fungus diseases, particularly black-spot. This has no doubt led many growers to consider too lightly the dangers to be expected from the last-named disease during a season such as the present one. In many such cases the effect has been the lessening of the preventive measures necessary earlier in the season, with the result that black-spot is now far more in evidence than it otherwise would have been, notwithstanding the severe weather-conditions.

It has been previously stated in these notes that the lime-sulphur solution, although so far satisfactory as a preventive for

black-spot, had yet to prove its efficiency in this direction under more adverse conditions supplied by a wet season such as the present. On this question some very useful information should be available later, as considerable reliance has been placed on this spray by many growers throughout the country.

In the meantime, should the weather-conditions remain the same and black-spot continue to cause trouble, lime-sulphur at the rate of 1–80 to 1–100, or 3–4–40 Bordeaux mixture, should be applied frequently and thoroughly. In cases where the fruit is more than moderately attacked I would recommend the Bordeaux mixture in preference, despite the danger of spray-scorch. To lessen the danger of such scorching every care should be taken in mixing the ingredients. Use wooden vessels; slake the lime slowly, using a little hot water. After slaking add half the total quantity of water. In a second vessel dissolve the bluestone with about a gallon of hot water, and add to this the other half of the total quantity of water. Pour the two solutions slowly and simultaneously into a third vessel, stirring well whilst this is being done. Test the mixture with a piece of litmus paper. The mixture should show an alkaline reaction by pink litmus paper turning blue on being immersed in the mixture.

Bordeaux is also the best remedy for Irish blight in potatoes and tomatoes, but in every case of fungus-control it must be remembered that prevention is better than cure. With this end in view early and thorough sprayings are imperative. Cures at best are only partially satisfactory.

To check powdery mildew and to prevent the increase of red mite lime-sulphur should be used in combination with arsenate of lead at each spraying for codlin-moth.

CODLIN-MOTH.

Many people in the past have made the mistake of ceasing to spray for the control of moth too early in the season, and no doubt some will continue to do so. There have been many instances where fairly good work has been done in the earlier part of the season, resulting in clean fruit, up till the end of December. Spraying had then ceased owing to the impression that all danger of the moth was past. This is a great mistake, as all who are acquainted with the habits of this pest are fully aware. In reality the most dangerous period in all the warmer districts is during the latter end of January and during February. It is then that the second brood appears, and these hatch more simultaneously than do the first brood. If provision is not made against attacks from the second brood during the later period mentioned the amount of damage done will be heavy, resulting

in almost entire waste of all the energy and material expended in connection with the earlier sprayings.

As previously stated, spraying for codlin-moth should be repeated at intervals of not more than three weeks. The fourth application should be made about the end of December; the fifth by the 21st January. For this purpose use arsenate of lead as specified below.

SPRAYINGS FOR THE MONTH.

Codlin-moth.—1½ lb. to 2 lb. (paste) or 1 lb. to 1¼ lb. (powder) of arsenate of lead to 50 gallons of water. Spray at intervals of not more than three weeks. When required, the arsenate of lead can be combined with either lime-sulphur or Bordeaux mixture.

Black-spot.—Lime-sulphur, 1–80 to 1–100, or 3–4–40 Bordeaux mixture. Combine with arsenate of lead.

Powdery Mildew.—Lime-sulphur as for black-spot.

Red Mite.—(Pip-fruits.) Lime-sulphur as for moth. "Black-leaf 40," one part to 300 of water. Combine with arsenate of lead.

Red Mite.—(Stone-fruits.) Lime-sulphur 1 to 125 of water.

Woolly Aphis.—"Black-leaf 40" as for red mite. Resin-and-soda compound. (See November *Journal.*)

PEACH-MARKETING.

The main feature of the month, particularly to the growers of stone-fruits, will be the harvesting of the peach crop. Peaches will come in with a rush, which will continue throughout the month, leaving the orchardist very little time to attend to much else. The last few days prior to ripening makes a wonderful difference to the peach. This necessitates careful watchfulness during the picking-time.

With the exception of pears, most fruits are superior in appearance and flavour if allowed to ripen on the tree, and this applies particularly to the peach. To gather and market the fruit in this condition for other than purely local purposes is, however, out of the question. For forwarding any distance to the market the fruit must be gathered prior to ripening. At the same time, whilst being hard and firm it must be mature. Owing to the rapidity with which the change takes place from firmness to ripeness, picking must be attended to every day. In knowing just the proper state of maturity at which to pick lies the main secret of successful peach-marketing.

Picking and packing hard immature fruit must be avoided. Such fruit will not ripen satisfactorily, in extreme cases not at all. The sale of peaches of this class by fruiterers in the past has been a very bad advertisement for many districts, and also for the peach as a dessert fruit.

Grading for size, colour, and maturity, combined with careful packing, is essential in preparing the fruit for the market. Peaches are usually marked as "Special" or "Crate" fruit, and "A," "B," and "C." The crate fruit is comprised of extra-large well-coloured fruit which are packed in punnets and forwarded to the market in crates. "A" comprises well-coloured unblemished fruit, slightly smaller than "crate." "B" comprises fruit not well coloured, and smaller than "A." "C" are usually small and otherwise faulty, and are suitable only for pulping purposes.

It is a mistake to place inferior fruit upon the ordinary market, particularly the peach, as such fruit tends to adversely affect the price of the better quality. It would be better to use it for pulping purposes or as pig-food. In any case it is certainly unwise to market immature peaches for dessert purposes.

CULTIVATION.

Although the soil of the orchard may be more moist than usual, this feature of the work should not on that account be neglected. Keep the scarifier going when possible. This will sweeten up the soil and keep down weeds.

SUMMER ATTENTION TO YOUNG TREES.

Summer pruning in the nature of opening up overcrowded young trees by removing such surplus growth during the growing season is a matter of considerable importance. This work should be carefully attended to from the first season after planting onward until the trees come into bearing—that is, presuming the trees are making the normal healthy growth necessary and desirable in young trees. The operation consists of the total removal of all surplus woody growths arising from the centre and framework of the trees where such are calculated to overcrowd or to divert the sap from those portions it is necessary to strengthen and build up.

When properly and carefully performed this work exerts a very valuable influence on the ultimate production of a well-trained and evenly balanced tree. The training of a fruit-tree into practically any shape desired is, under favourable circumstances, a comparatively easy matter. Intelligent treatment at the winter pruning combined with timely attention in the summer will ensure this. Unfortunately, the most favourable circumstances are rare: outside influence in the shape of weak growth, damage during cultivation, severe windstorms, &c., intervene, and are to be more or less expected.

Up to a certain stage in the early summer the vigorous young growths arising from the main arms of the tree are very easily

blown out at the base. When this takes place the difficulties of training the tree commence. A young tree may be well pruned at the winter pruning and all provision made for subsequent extension in the direction required. The growths provided for may start perfectly, and may subsequently be destroyed in the above manner by a severe windstorm. If wind comes after the growths are sufficiently strong to resist it, damage is often done to the leaders through the breaking of the tips. In either case the check to the tree is such that undamaged growths arising from some unsuitable position are almost sure to take up the running, and, if not checked, outgrow the selected leader. Damage such as this forms the main difficulty in the raising of a perfectly shaped tree.

It is in such cases as this that the advantages of summer treatment specially apply. Immediately growing trees are damaged in any way a fresh selection of growths should be made; those that are considered most likely to satisfactorily remedy the damage should be encouraged, whilst growths likely to interfere with the development of those selected should be suppressed. The removal of surplus growths from young trees should be attended to as early as possible, always allowing for possible wind-damage, and completed early in January. In the case of vigorous trees of four and five years of age it is not imperative that the cutting-out should be completed so early in the season. Such trees are sufficiently vigorous to withstand the shock—in fact, it is often an advantage to steady the growth of such trees by means of summer pruning.

THE POULTRY-YARD.

F. C. BROWN.

THE GROWING PULLET.

Now that the pullets are half-grown it is a mistake to neglect them in any way. In order to obtain the best results from them, and so that they will make long-season layers, special care until they reach their full stage of development is necessary. A matter that should not be neglected now is to prepare the permanent quarters before the birds are placed in them. Where the growing stock are to be transferred into houses where adult stock have previously been kept, these quarters should be given a thorough cleaning and be sprayed with a strong sheep-dip, so that the young birds may be safe from infestation of the vermin which is usually found in the ordinary fowl-house at this season of the year. Confined quarters

are not desirable for growing stock. The object should be to keep them steadily growing under the most natural conditions possible, and in this respect a good range, especially in an orchard, will do much for their natural development.

The feeding of the growing pullet is very important. The best of grain should be used; crushed oats are always a valuable addition, providing, of course, the desired quality is available. While animal food is necessary, it should be fed sparingly, or it will have the effect of forcing the birds to maturity, one of the most fatal blunders in the poultry business. To boast of birds of a strain that commence to lay at a very early age is a bad fault, for it means the encouragement of short-seasoned layers of small eggs. Besides, such birds never make good breeding-stock, being susceptible to many forms of disease that affect poultry. Generally speaking, even with such early-maturing breeds as the White Leghorn, the birds should not commence to lay before they are six months old, in order that they may grow to the necessary size, possess the requisite constitutional vigour, and produce the maximum egg-yield.

Shade is another matter which must not be neglected, in order that when the weather is hot the growing birds may have protection from the strong rays of the sun, thus securing ample fresh air and being encouraged to keep outside the house. While green stuff is absolutely necessary for birds of all ages, it is especially so for young stock If the grass in the runs is not young and tender other green food must be supplied, such as chaffed lucerne, clover, silver-beet, cabbage, lettuce, or watercress.

Do not on any account overcrowd; it is one of the mistakes which never fails to make trouble. The profits to be made from fowls depend in a great measure on the management the birds receive during all stages of their development. The slightest set-back during this period is never caught up.

HEAD-LICE.

Several complaints have recently reached me of loss of chickens solely due to head-lice. This variety of louse, which infests the head of both young and adult stock, is much larger than the ordinary body-louse, which is mostly found around the vent. When these pests are present and a close examination is made of the bird's head the lice will be seen with their heads buried deep into the flesh and gorged with blood, the loss of which gives the bird an anæmic appearance. In practically all cases where I have been asked for advice and had an opportunity of visiting the plants I found that the presence of these blood-sucking vermin was chiefly

due to dirty or overcrowded quarters. Like many of the other troubles that affect poultry, the only safe way is to prevent it, and the chief preventive measure is cleanliness. Once the birds become infested with these insects individual treatment is necessary. There is a cure, but it must be sparingly applied. This is a light application to the head of an ointment composed of one part of sulphur to two parts of lard. If too much is applied the heat of the sun will make this run over the face and eyes, which will then become scalded. In the case of chicks becoming infested when being reared in the natural way, the mother hen should in addition be dusted with a mixture of carbolic powder and flowers of sulphur.

POISONING SPARROWS.

Recently at the Department's Milton Poultry-station an excellent illustration was provided of the efficacy of poisoning as a means of dealing with the sparrow nuisance. Immediately after a paddock was sown down with oats poisoned hulled oats were scattered over it. The sparrows ate them greedily, with the result that dead sparrows were found in all directions. The poison was prepared as follows: 1 lb. brown sugar, 1 oz. strychnine, and 1 gallon of boiling water were put into a bucket; after stirring, 12 lb. of hulled oats were added. The mixture was well covered and allowed to steam for thirty-six hours; it was then lightly spread over empty sacks for several hours to dry before spreading. The experiment proved satisfactory from all viewpoints. Not a single fowl was lost by small birds carrying the poisoned grain or the dead sparrows falling into the poultry-runs. No doubt if farmers generally adopted a similar line of action after sowing a paddock it would have the effect of giving the sparrow pest a severe set-back.

INDIAN RUNNER DUCKS.

A correspondent asks if Indian Runner ducks will pay to keep. That they will pay, and pay well, from an egg-producing viewpoint is undoubted—provided, of course, a good laying-strain is kept and that they are properly managed. Under certain circumstances and conditions a flock of these birds may easily return a greater profit than would a pen of fowls. Probably the chief reasons why more of this particular breed of duck are not kept, and in larger flocks, is because the carcase is not favoured by the city poulterer, and on account of the difficulty often experienced in marketing duck-eggs, the price of which is generally below that of hen-eggs. Another objection, which applies to all breeds of ducks, is the dirty condition in which the run becomes where only a small run is

available, especially during wet weather and where the soil is unsuitable.

Apart from these drawbacks, however, Indian Runner ducks have much to recommend them. In the first place, where a good range is available—say, in an orchard—the birds, being great foragers, will pick up a good part of their living. There are other advantages. They do not require houses—good shade and shelter are all that is necessary in the greater part of New Zealand; the cost of erecting runs is much less; the ducks are easy to rear; they are less susceptible to disease; they give good results for several seasons, and will do well on a cheaper food than is required for poultry. The number of eggs that these "egg-machines" will turn out with proper management is surprising, the requirements being a good range, and a mash of equal parts of pollard and bran, a half part of maize-meal, and 5 per cent. of meat-meal, to which may be added up to 25 per cent. of chaffed lucerne or clover. Ducks give best results by feeding mash entirely, no hard grain being required by them. Care must be taken not to change the food or quarters when the birds are in a laying-condition, or it will have the effect of putting them off the lay for possibly several weeks.

THINGS TO REMEMBER.

Skim-milk may be used to advantage with birds of all ages.

It is only inviting trouble to make the buildings carry more than they will accommodate.

The high-type layer cannot be overfed with the right class of food.

In the absence of a supply of animal food fowls cannot lay to their maximum capacity. Where fresh meat cannot be obtained meat-meal may be used.

Beauty and utility are not inseparable, but in the absence of poultry shows and a sound system of judging this fact is apt to be ignored. Aim at combining the two rather than separate one from the other.

A good percentage of fertile eggs can be obtained from Indian Runner ducks when they are kept away from water to swim in, but for the heavier breeds better results are obtained if water is provided.

A crooked breast-bone injures the sale of a table-bird, and is often the cause of birds being passed in the show-pen. To prevent this chickens should not be allowed to roost till they are three months old, and even then should not be put on a round or narrow perch.

THE APIARY.

F. A. JACOBSEN.

FROM now onward the bees should be gathering honey freely, and it is advisable to give ample storage-room to secure the maximum of nature's bounty. In colonies that have not swarmed solid frames of brood should be in eight of the ten or twelve frames in the brood-chamber, and any queen who has had the advantage of ample stores to date, and yet has failed to equal the above, should not be tolerated longer. Untested leather-coloured Italian queens can be purchased at a reasonable rate from any reliable queen-breeder, and these have been found to give general satisfaction. However, the beekeeper who rears his own queens is in a position to secure them early and at the most suitable time, and does not have to wait until his orders can be forwarded, which often occasions dissatisfaction.

QUEEN-EXCLUDERS.

The merits and demerits of queen-excluders have frequently been discussed in these columns, but a reminder that the season is at hand for their most advantageous use is opportune. In most districts it has been found advisable to permit the queen the use of two brood-chambers — the brood-chamber proper and a super above; but the honey-flow having now got well started, the plan to adopt is to place as much as possible of the brood in the upper stories, with the queen on practically empty combs in the brood-chamber proper with an excluder above. This ensures solid combs of honey at extracting-time, and does away with the picking-over of combs and leaving those containing brood behind. In this way much time is saved at the busiest period of the season.

INTRODUCTION OF QUEENS.

A previous note by the writer on the introduction of queens by the smoke method still holds good, and further satisfactory reports are to hand. The method is to smoke the bees through the entrance, and then blow the young queen into the hive-entrance with smoke almost immediately after the dequeening process. Close the entrance with a strip for a few minutes. Instructions for introducing by the "eating out" method are always sent by the queen-breeder with each queen mailed, and this is the safer plan for the amateur.

IMPORTATION OF QUEENS: A WARNING.

There are in other countries several bee-diseases that have not yet found their way to New Zealand, and when importing queens

SHOP-WINDOW DISPLAY OF NEW ZEALAND HONEY AT BATH, ENGLAND.

From honey graded for export by the Department last season.

great care must be exercised to safeguard against the introduction of these troubles. The Apiaries Act provides the authority for strict measures to be taken in reference to this matter, but at the same time it is the duty of the beekeeper to attend to his own interests. I do not think that any beekeeper of standing would send queens from diseased colonies, but it would be as well to transfer all imported queens to a fresh cage with new candy, and to destroy the bees accompanying her. The old cage and contents should be burnt, as the chief source of infection would probably be in the candy. We do not want the Isle of Wight disease or European foul-brood, or even the "disappearing disease" of Australia, which would enormously increase the difficulties of our industry.

THICK HONEY.

In many districts a problem is presented by the early gathering of thick unextractable honey. If this is left in the hives the clover and thistle crops are spoilt and greatly reduced in value. The work necessary to remove honey of this nature before the main clover flow is not looked forward to, but this is what must be done. The colonies can be extracted bare of the later crop and the thick honey utilized for winter stores. Great care must be exercised, however, as this is a way amateurs have of spreading disease, and all colonies from which thick honey is taken must be free from foul-brood.

THE IMPORTANCE OF BEES.

Were the question put to a farmer, "What are the chief necessaries in the production of your crops?" he would most assuredly answer, "The frequent loosening of the soil by ploughing, judicious manuring, good seed, freedom from weeds, and favourable seasons." No matter what branch of soil-culture the individual may be engaged in or what crops he is growing, be he orchardist, agriculturist, market-garderer, florist, &c., the answer would be substantially the same. There are, however, tiny agents employed by nature that dwarf into insignificance all the modern implements of husbandry that are employed to ensure a good and abundant crop. These tiny agents are an absolute necessity for the production of a crop from members of the vegetable kingdom, yet they are seldom taken into account. Insects are the agents referred to, and through them the necessary fertilization is accomplished. Nature employs these and many others of a subordinate character to assist in the grand scheme of production.

THE FARM GARDEN.

W. H. TAYLOR.

VEGETABLE-CULTURE.

THE most important work in January is to complete provisions for winter supplies. As I have said before, exact dates cannot be given for all districts. Some plants can be put out much later in the warmer parts of the Dominion than in other places and succeed, to some extent at least. For instance, cabbage and broccoli plants were put out at Arataki (Hawke's Bay) on the 25th March last. These, although useful, were not full-sized, but in Wellington Province, where my experience was mostly gained, they would have failed utterly. Naturally it would be the same farther south and in cold places in the north. I saw Brussels sprouts planted by a neighbour about the same time: they failed, of course. Brussels sprouts and broccoli must have a long period of growth to give good results. With Brussels sprouts there is no half-way—they succeed or they fail. Experience shows that to attain perfect success January, or thereabout, is the time to plant these members of the Brassica family for winter use.

Celery.—The main planting should be over now, and this should be the last. There is no advantage in planting later. Trenches should be well manured, and in dry places they should be deep. Plenty of water at planting-time is necessary. A little shade is a help—nothing better than tree-fern fronds. Celery is at times attacked by a small louse-like insect, which appears in great numbers. Spraying with XL-all fluid, Vistolene, or Robinson's Pine Spray will eradicate the insects. They should be attacked as soon as seen. They weaken the plants greatly, and if allowed to get a strong hold will destroy the plants.

Peas.—In the hottest districts it is not worth while sowing peas in January; it is too hot for them. In the colder parts they will not make growth quick enough to be able to form pods before it is too cold. In localities with medium climatic conditions a sowing may be made early in the month.

French beans may be sown everywhere throughout January.

Silver-beet will succeed anywhere. It is a sure stand-by. It bears both heat and cold well, and is comparatively free from blights or insect pests. Sown now, or by the middle of February, it will be useful through winter.

Spinach may still be sown in small quantity.

Sow *lettuce* in rows, and thin the plants. This is more sure than transplanting, quicker, and gives less trouble.

Sow *radish* about every fourth week, or a little oftener. If the seed comes up quickly, a matter depending on moisture, they begin to be usable in three weeks, and the bed should have a life of about four weeks, this depending to some extent on variety. I find the long white variety, Icicle, to be excellent in every way. The scarlet turnip variety, Wood's Giant Faring, is better than most of the type.

Marrows, pumpkins, cucumbers, and *melons* are all in strong growth. A good many people think these require fertilizing to make them bear fruit. Such is not the case. All that is necessary is to cut the tops off the strong runners; this causes a check, and forces out side laterals, which are the true fruit-bearers. These plants are like tomatoes in that they naturally grow far too strongly, and a check by restricting growth promotes a more fruitful habit. It is a good plan to sow seed of marrows, &c., that is at least two years old, this being known to give more fruitful plants. A very old plan also among good gardeners is to grow their cucumbers from two-year-old seed. Weeds should be rigidly suppressed. They are robbers in more than one way: if they seed their progeny give work, and while they grow they are taking the moisture and something else out of the soil. Work the surface soil often enough to keep it loose. Soil kept loose by working will, of course, have no roots in it; it acts as a mulch for the moister soil below, preventing evaporation. The loosening also ventilates the soil, allowing the escape of noxious gases that form from decaying matter and are excreted by the roots of plants; it also admits air which contains fertilizing properties.

SMALL FRUITS.

Raspberries.—Plantations of this fruit often have but a short life of usefulness because of mistaken treatment. It is quite common to let them grow almost as they like. In average places such treatment is disastrous—two or three years of plenty, then collapse. Few things are worth doing at all unless they are done well; raspberry-cultivation is one of such. The first mistake is to plant fruiting-canes and let them fruit the first year. Treated in that way there is no solid foundation to start on. Another and even more general cause of failure is allowing suckers to crowd the lines in summer. Also, too many canes are left at each stool. About half a dozen canes is enough, and the stools should be far enough apart to allow the sun to shine on the canes all round, 5 ft. being little enough from centre to centre. Young suckers always spring up in numbers that are in excess of needs, and the more this is allowed the worse the trouble is. If from the start surplus suckers

were dug out they would never become a serious menace. Merely hoeing off does not destroy them: they spring again. Between the lines cultivating is easy, and can be done frequently enough to cope with them, but between the stools it is hand work. Dig out early all surplus suckers, leaving only enough for fruiting the next season. Not being crowded, the young canes will develop properly, and with proper treatment otherwise continued crops of good fruit are assured. The best suckers for new plantations are those that come up at a distance from the old stool and do not grow to any height, but are each furnished with a good bunch of fibrous roots. If fruiting-canes have been planted they should be cut down to about 8 in.

Black Currants.—Where much growth is being made some opening-up is necessary. Light and air play an important part in the ripening of wood and perfecting of fruit-buds. The growths must not be shortened, but a judicious thinning-out of shoots will do much good. Now is the time to do it.

Red Currants.—As these never bear fruit on year-old wood, the treatment is quite different from that of black currants. It is usual for the bushes to make a lot of strong lateral shoots, all strong enough for leaders. If these are left to crowd the bush it will not bear fruit as it should. Such shoots should now be shortened to about 6 in. They will be shortened more in winter, but not now, or the lower buds that should turn to fruit-spurs would develop wood.

FLOWER-CULTURE.

Carnations.—The plants should be flowered two years only; after that they become straggly, and the flowers deteriorate. That is the usual way of stating the case, and it is correct. Yet it is not always advisable to work that way. Where large quantities of cut flowers are required it is best to leave the plants till they wear out. Old plants give large numbers of flowers, not of the higher quality, but good enough. There is a difficulty in tying them up, but large plants do not need this so much. If they can be planted on the brow of a bank the flowers will droop over the side. They look very fine in such a position, and do not require tying up. January is the correct time to layer for new plants, and layering is so much the best way to raise them that no one who has the plants to layer should resort to pipings for new stock. If it is desired to put in pipings they should be placed in a shady position. It is impossible to prevent them withering, which they do at the time if exposed to full sunshine. Pipings are at this time best put in boxes, as later on when they are rooted they can be moved to

a sunny position. It matters little what soil is in the box, but it should be surfaced with about an inch deep of sand. Now is an excellent time to sow carnation-seed. The seedlings should have time to make good plants before winter, and be in a good state for flowering next season.

Seeds of biennials of some kinds and perennials of any kind may be judiciously sown.

Canterbury bells should be sown at once. An early start is necessary in order to secure good flowering-plants next season. *Sweet-williams* also, if they are got ready to plant in autumn, will flower next season quite freely; not so, however, if they are sown later and planted in spring.

Perennial climbing-plants and other ornamental flowering-shrubs that may be raised from seed are better sown now than nearer the winter. *Begonias, passifloras, tecomas, tacsonias, hardenbergias, Schinus molle,* and *Grevillea robusta* are among the number. Some of these seeds take a long time to germinate, not always because they are hard, but because it is their nature. Hard seeds may be soaked to hasten germination, but it is a risky thing to do, and my advice is not to do it. Better to prepare the boxes of soil carefully, using soil that has plenty of sand in it, so that it cannot get hard. Look after them carefully, and if one or two plants come do not think no more will germinate, but have patience. I have *hardenbergias* now breaking through that have been seven months in the box. *Schinus molle* comes up quickly. *Grevillea robusta,* which is a soft seed, takes much longer to germinate.

Lift *ranunculus* corms and store them in a dry place. I prefer to keep them in dry sand. They do not then shrivel up as they do if exposed to the air.

Lift *hyacinths* and dry them well in a shed, not in the sun; then store them in a drawer or a partitioned box. Do not wrap them in paper.

Tulip bulbs should be lifted before the foliage is quite dead, so as to retain the brown outer covering of the bulbs, which is lost if the foliage becomes quite dead before lifting.

Importation of Live-stock into Solomon Islands.—The Acting High Commissioner of the Western Pacific has issued a King's Regulation (No. X of 1915) to prevent the introduction into or spread within the British Solomon Islands Protectorate of contagious or infectious diseases of animals. Various conditions are imposed respecting the importation of live-stock into the group. Particulars may be obtained from the Director of the Live-stock Division of the Department, Wellington.

ANSWERS TO CORRESPONDENTS.

IN every instance a question to which an answer is desired in these columns must be accompanied by the full name and the postal address of the inquirer, not necessarily for publication, but as a guarantee of good faith. The question should be written on one side of the paper only.

LIME FOR SWAMP SOILS.

CHARLES MCKENZIE, Ngaere :—

Would you kindly let me know what is the best lime to use for swamp soil. There is plenty of humus mixed in the soil, and rushes are growing abundantly. It has been drained for some years, but the soil has rather a nasty smell yet. Some have told me "burnt and slacked," others "burnt and ground," while others have said "ground and unburnt." Which would you advise either as a top-dressing or to put in for a root crop ?

The Fields Division :—

Use ground burnt lime at the rate of 1 to 2 tons per acre. Having ploughed the land and rough-disked it, scatter the lime broadcast and work it with disk and harrows. A Wallace machine, used for broadcasting slag, makes a good job, provided the air is comparatively calm. There are also other excellent lime-distributors on the market. The lime should be worked in as early as possible, a root crop following if desirable. Owing to the present season being well advanced, the lime will not show its full action until next season.

FRUIT-TREE STOCKS AND GRAFTING.

CEDRIC WATSON, Thames :—

Will you kindly supply answers to the following questions :—

1. How are paradise stocks prepared and increased ?

2. Have you heard of any apple-stock which, while resisting, readily grows from slips ?

3. Can you give a reason for a large percentage of Northern Spy scions grafted on to Northern Spy roots failing to grow, and do you think they could have been strangled by too tight binding with raffia ? Scions were cut in July, grafted on fresh dry root in September early, and no grafting-wax used.

4. Is it true that a double root-graft with Northern Spy next the scion is superior to Northern Spy root only, inasmuch as it is not too vigorous and comes earlier into bearing ?

The Horticulture Division :—

1. Paradise stocks are obtained by cuttings, layering, or root-grafting.

2. Practically all varieties of apples will grow from cuttings, but some more readily than others. Those varieties having aerial roots, such as the Northern Spy, usually strike most readily.

3. When properly performed, root-grafting should rarely fail. Tying up with a little waxed cloth, although not essential, is an advantage. In your case the raffia binding may have been the cause of the failure.

4. There should be no difference whatever in the vigour of the trees worked in the manner you mention.

CORAL SAND AS A LIME DRESSING.

"KIRIKIRI," Rarotonga, Cook Islands :—

I have forwarded a sample of beach-sand composed of naturally pulverized coral rock, with a considerable intermixture of dark material derived from the volcanic rocks of this island. As there is an abundance of this material available at a very trifling cost, I should be glad to learn of what value it would be compared, say, with burnt lime, which is rather an expensive item. The land on which the sand would be used is a drained swamp; the soil is a deep black loam, very rich in humus, and very friable when broken up. In some parts, however, it is sour and of a peaty nature. It is proposed to grow tomatoes on this land.

The Chemist :—

The samples have been analysed, with the following result: Insoluble matter (sand, &c.), 10·7 per cent.; iron oxides and alumina, 6·3; calcium carbonate ($CaCO_3$), 80·6; phosphoric anhydride, trace; magnesic carbonate and undetermined, 2·4: total, 100·0. This sand, containing 80·6 per cent. carbonate of lime, will be a very useful dressing for soils requiring lime, as it can be readily bagged and applied to the land without any treatment.

COWS CHEWING BONES, WOOD, ETC.

"WAXFLOWER," Carnarvon :—

I have noticed my dairy cows chewing bones, gorse-sticks, pieces of board, and some other kinds of wood. I have salt, and only a few touch it; and, besides, my farm is situated only four miles from the sea-coast. Could you inform me why they do this, and what is lacking in food or in the soil that makes them do it?

The Live-stock Division :—

The habit mentioned indicates a deficiency of some substance or substances in the herbage which is essential for the proper nutrition of the animal. These substances are believed to be phosphates and lime, or probably both, the trouble being seen on land naturally deficient in both these, and when it has been laid down and grazed for a lengthy period without anything being returned in the way of manure. The paddocks should be top-dressed with some phosphatic fertilizer. The administration of phosphates to individual cows will check the habit. You may give 1 oz. doses twice a day of compound syrup of phosphate of iron (Parrish's chemical food), or ½ oz. doses of precipitated phosphate of lime daily with some bran or pollard.

TREATMENT OF PUMICE LAND.

J. K., Putaruru :—

I would be very pleased if you could advise me as to the best mixture of grasses to sow upon pumice land. The land in question has been ploughed and a crop of turnips taken off, and I want to sow it down in pasture. I would also like to know what quantity of manure and what sort you would advise to use for this purpose; also what manure you would advise to use for turnips, and if it would be possible to get grass to grow on surface burns, as I have a lot of sidelings which I could burn off if I thought I could get grass to take. These sidelings are growing nothing but a stunted tea-tree and fern at present.

The Fields Division :—

The following mixture of grasses should give a good account on your particular class of soil: Cocksfoot, 7 lb.; tall oat, 4 lb.; sheep's fescue, 3 lb.; hard fescue, 3 lb.; *Poa pratensis*, 3 lb.; Italian rye, 5 lb.; brown-top, 2 lb.; *Danthonia pilosa*, 3 lb.; alsike, 1½ lb.; white clover, 2 lb.; cow-grass, 1½ lb.: total, 35 lb. As manure use 1½ cwt. basic superphosphate, 1½ cwt. Pacific Island guano, and 1 cwt. blood-and-bone manure per acre. For turnips, equal parts of basic superphosphate and blood-and-bone manure, at total rate of about 3 cwt. per acre, should give you satisfactory results.

In cultivating your land heavy rolling followed by brush harrowing, to prevent expansion of moisture after consolidation, should as far as possible be practised. Systematic green-manuring of cultivated land (lupins, peas, white mustard, &c., being suitable for this purpose) should as far as possible be also adopted.

The burning-off periodically of fern on light pumice is not a practice to be commended, as it tends to burn out what little humus is in the soil. Stocking with young cattle, followed by ploughing, where possible, is the most desirable practice. As an experiment you could burn off a small area and determine whether or not the grass mixture recommended will take a hold on such soils. Seed the grass if possible at a good time—when rain is imminent.

WOOL-SHED AND SHEEP-DIP.

WILLIAM PENNEY, Punakitere :—

Could you give me advice regarding a wool-shed, say, about 80 ft. by 40 ft., describing the best way to build it, height of stud, and, roughly, amount of timber; also advice as to a concrete sheep-dip, stating roughly the amount of cement used for such. Would a proportion of 4 to 1 make the dip of fair strength for dipping large numbers of sheep?

The Live-stock Division :—

Plans of a shearing-shed, sheep-drafting yard, and sheep-dip, which the Department recommends, have been forwarded to you. All particulars of timber required for the wool-shed, are shown on the plan. These plans can be modified to meet requirements. With regard to quantity of cement to gravel for concrete sheep-dip, we do not think that a ratio of 4 to 1 would be sufficient. When going to the expense of making such a dip it is advisable to take no risks.

CONTROL OF GRASS-GRUB.

"SUBSCRIBER," Taradale :—

I would like to try bisulphide of carbon for killing the grass-grub in a strawberry-bed, as the grub is very bad here. Kindly let me know the cost per gallon, and how to use it? Will an Eclair Vermorel knapsack spray-pump answer the purpose? Also, where can I procure the bisulphide? Has the Department any other remedy for destroying grass-grub in strawberry-plants?

The Horticulture Division :—

For the control of grass-grub the bisulphide is not sprayed on to the plants, but is injected into the ground close to affected plants as per separate directions forwarded to you. The grass-grub is very difficult to control once it obtains a good hold, and we regret not being able at present to suggest any other means for destroying it. Carbon bisulphide is rather expensive, costing about 1s. per pound, or a little cheaper, according to quantity ordered.

CURING RABBIT-SKINS.

"ECONOMY," Bellevue :—

I would be much obliged if you would kindly tell me how to cure and prepare rabbit-skins suitable for making up into rugs. The ones I have done—at least, the older skins—are too stiff.

The Live-stock Division :—

The following is a suitable process for the curing of rabbit-skins: Mix bran and soft water sufficient to cover the skins. Immerse them and keep them covered for twenty-four hours; then remove, wash, clean, and carefully scrape off all flesh. Then take 1 gallon of hot water and dissolve in this 1 lb. alum and $\frac{1}{4}$ lb. salt; cool so that the hand may be put in; immerse the skins for twenty-four hours; dry partially by rubbing. After this immerse for twenty-four hours in oatmeal and warm water; partially dry in the shade, and finally rub until entirely dry. This leaves the skin like white leather and fit for use.

PLANTING OF WEEPING-WILLOWS.

B. B., Owhango :—

Would you please inform us,—

1. What is the best time of the year to plant weeping-willows ?

2. What is the best size to cut the limbs to be planted—length and circumference—to ensure a good shady tree in the quickest possible time ?

3. Would December and January be improper months to cut and plant same, assuming that that was the only time they could be got in owing to state of roads ?

The Horticulture Division :—

1. In the autumn, or any time during the dormant season.

2. 5 ft. or 6 ft. long by about 3 in. in diameter. If the position is suitable the size matters little.

3. As you will see from the reply to your first question, this is quite the wrong time for planting.

MOULD ON BACON.

W. H. CHETHAM, Onerahi :—

Can you tell me how to keep mould off bacon ? I have splendid luck in curing it, but it always goes mouldy. I even packed some in sacks with bran, but it moulded, and the bran stuck to the meat.

The Live-stock Division :—

Bacon, whether green or smoked, will (like old boots) become mouldy if kept in humid atmosphere, more particularly so in the absence of light ; hence the old and effective custom of hanging bacon from the roof or ceiling of the kitchen. To prevent mould, if for a small quantity of bacon, possibly you could not do better than follow the old custom. Should this be impracticable it should be hung in a cool dry place. In either case it is advisable to put the bacon in thin calico bags —butter-cloth would do very well. Some people, especially if the bacon is to be kept for a long period, put it in two coverings—first butter-cloth, then coarse scrim, with dried oat-husks between the outer and inner coverings.

CROPPING PRACTICE.

G. W. HART, Dalefield :—

I have a 4-acre paddock which I ploughed in September, 1913, out of clover. I put half the paddock in maize and half in peas. As soon as the peas were harvested I ploughed and put in oats, which I ploughed under in August for green manure, and put on ½ ton to acre of unburnt lime, and put back in oats for crop. Where I had the maize I put in oats and let go for crop. Then I ploughed the whole paddock, and last April I put in oats to feed off this spring. In the part where I had the maize and no green manure it is a really good crop and very dark green in colour. Where the peas were it is a very poor crop in places, not more than 3 in. high. The peas had basic slag ; the maize and all oat crops had meat-works grain-manure. The ground is light and a bit stony. Can you give me a reason why there is such a difference in the crop ?

The Fields Division :—

Placed in tabular form your cropping arrangements can best be studied and explanations offered.

First 2 acres.	Second 2 acres.
Clover sod	Clover sod.
Maize	Peas.
Oats for seed	Oats for green manure ; oats for seed.
Oats for feeding-off	Oats for feeding-off.

In No. 1 area you have a greater diversity of crops, hence a better rotation arrangement. Maize follows clover (nitrogen-gatherer)—a good system ; and maize, up to a certain point, has been found to stimulate nitrification—the formation of nitrates. Oats for seed and oats for feeding-off follow this excellent arrangement, and good results obtain. Were oats to be followed again, good results probably would not obtain unless the crop were well supplied with a nitrogenous manure, for the soil is light and lacks body, hence is naturally deficient in nitrogen.

Considering No. 2 area, peas (a nitrogen-gatherer), in form of a fairly vigorous crop probably, followed clover (also a nitrogen-gatherer). Oats followed, consuming a goodly portion of the nitrates accumulated as the result of the former two crops. The only nitrogen that was added was in the freezing-works manure supplied to the crop, oats not being able to take up nitrogen from the air. This crop was turned under and thereby added only carbon dioxide and water, in the form of carbohydrates, absorbed by its leaves. Oats (probably a fairly vigorous crop) for seed followed, exhaustion of nitrogen and other soil-constituents now taking place, for the crop's total needs would not be supplied by the small amount of freezing-works manure supplied it. Oats again followed, the depleting process again taking place. Thus three crops of oats were grown in succession on a light soil naturally lacking in humus, these three crops obtaining their main supply of food from the accumulations of nitrogen supplied by the legumes, clover and peas. This all emphasizes the importance of employing a leguminous crop, such as peas, as a source of green manure. Had you ploughed under the crop of peas, very probably your present results would be in favour of No. 2 area. Nevertheless, any soil becomes "sick" of producing the same crop over and over again. You should practise systematic green-manuring with leguminous crops.

CELERY-CULTURE.—KEEPING OF ONIONS.

"AMATEUR GARDENER," Pukekohe :—

I have celery-plants pricked out in boxes about 3 in. apart each way, and they will be ready to plant out at the end of December or beginning of January. How high should the plants be in the trench before they are earthed up?

Relative to growing onions: I generally plant the seed in the autumn and make four rows in the early spring, two rows being left in the permanent rows and two transplanted. The onions do not keep well. Would they keep better if the seed was planted in the spring instead of the autumn? I may say that I get a fine sample of onions, and do not harvest until they are thoroughly ripe, and they are put away thoroughly dry.

The Horticulture Division :—

In the case of celery, trench about 10 in. to 1 ft. deep, and work into the trench plenty of well-rotted stable-manure. Harden the plants off well before planting, and mould up with earth as plants grow. Celery requires fairly rich soil and plenty of moisture, and should be kept constantly growing to be successful.

Your onions would no doubt keep better if grown in the spring.

GRASS FOR SWAMPY WATERCOURSES.

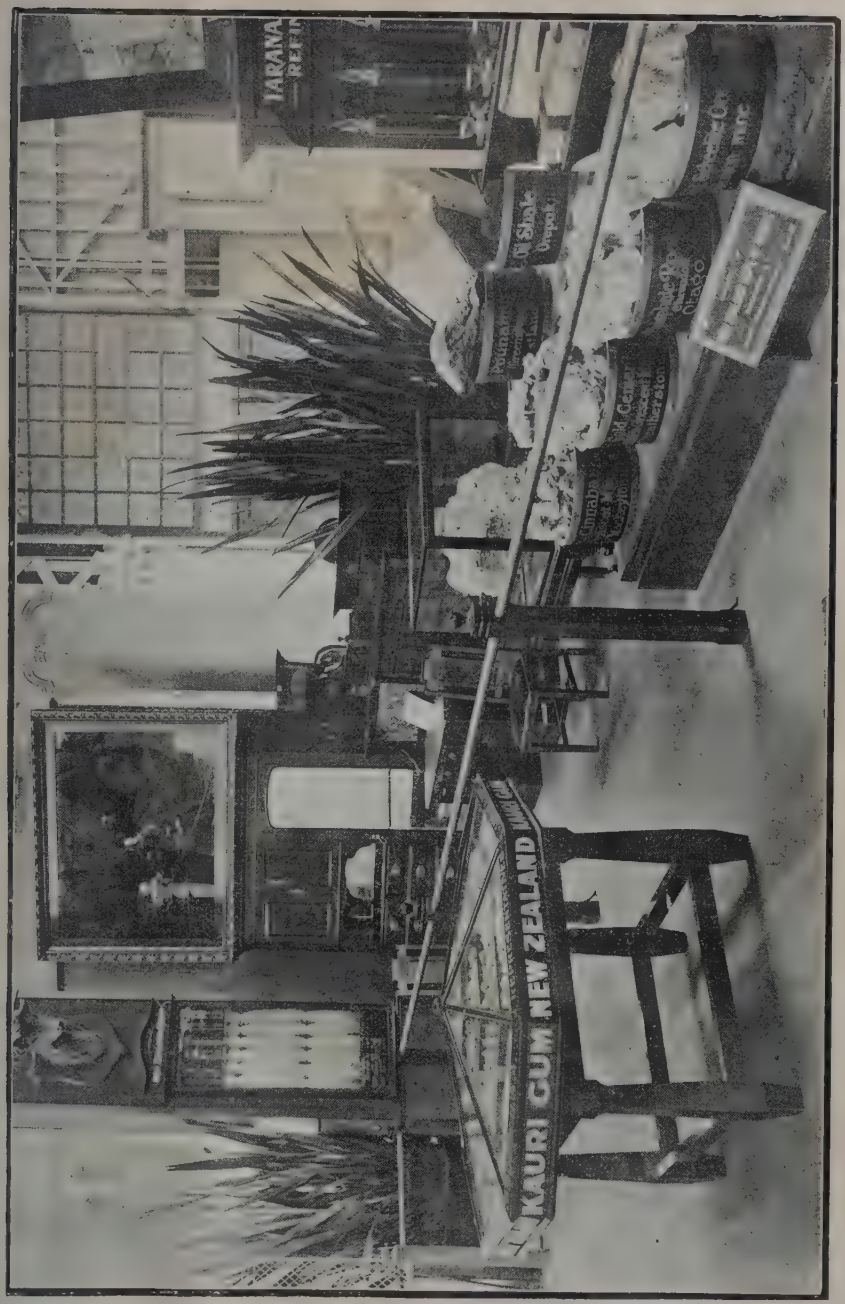
"FEN," Johnsonville :—

I have several swampy watercourses of a peaty nature which become covered with watercress and weeds. Would you tell me the best water-grass for cattle, how to establish it, and when? The watercourses dry up during the summer, but the bed remains moist and spongy.

The Fields Division :—

Paspalum digitaria, *Poa aquatica*, *Glyceria fluitans*, and *Lotus major* are best suited for wet, swampy watercourses. You could sow all of these, or, say, the first two and the last mentioned.

Paint for Outbuildings.—A correspondent asks for a receipt for a cheap durable paint for farm outbuildings. Mr. D. Oliver, Foreman Painter, Public Works Department, Wellington, to whom the matter was referred, states that if the colour does not matter the following is about as cheap and durable a paint as it is possible to make up: To 5 gallons boiled oil add 1 cwt. oxide of iron; let soak twenty-four hours; add 15 lb. patent driers and 2 gallons kerosene, and mix well together. The colour of this paint is dull red.



A CORNER OF THE NEW ZEALAND COURT, PALACE OF AGRICULTURE, PANAMA PACIFIC EXHIBITION.

COMMERCIAL INTELLIGENCE.

SOURCES OF POTASH-SUPPLY.

It having been brought under notice of the Department that potash deposits had been discovered in Spain, the High Commissioner, London, was asked to make inquiries as to whether supplies could be obtained from that source. Information received by the High Commissioner through the British Chamber of Commerce for Spain, at Barcelona, indicates that exploitation of deposits discovered a year or two ago at Suria, in the province of Barcelona, has not commenced. There are apparently other deposits in the province of Santander, which might possibly have been availed of, but the exportation of potash salts was definitely prohibited by the Spanish Government in August last. In the meantime, therefore, the matter is at a standstill.

THE MARGARINE AND BUTTER TRADES.

Drawing attention to the great development which continues to take place in the margarine trade, the High Commissioner, London, reports, under date 12th October last, as follows:—

During the last few years the consumptive demand for margarine has been increasing rapidly, and during the last twelve months it has increased more rapidly still. So great has this demand become that manufacturers have the greatest difficulty in filling orders, and in some cases they find it almost impossible to do so. Some time ago a new brand of high-grade margarine was placed on the market, the wholesale price of which is 9d. and the fixed retail price 1s. per pound, which it will be seen leaves 3d. per pound for the grocer's expenses. The success of this line has been remarkable, aided no doubt in no small degree by the retailers pushing the sale of an article that returns them a good margin of profit, which for some time butter has not done. The worst feature in the case is that this class of margarine has, according to the opinions expressed by the trade, permanently displaced butter in the consumptive demand to a very considerable extent in quarters that had not hitherto been affected.

The butter position in this country has been a most unsatisfactory one for some time. The premier country from which the bulk of choicest butter is obtained is Denmark. Denmark has been exporting largely to Germany and Austria and latterly to Switzerland, and on account of the great shortage of butter and other fats in these countries the demand for the Danish article has been very keen, and prices are ruling very high. So far as the United Kingdom is concerned, retail prices for this class of butter are from 1s. 11d. to 2s. per pound, which has greatly curtailed the consumption, because people generally cannot afford to pay so dearly for this class of goods. Prices for Irish creamery have risen in sympathy, but the supply is not large and is decreasing. Siberian butter has, with few exceptions, been coming to hand badly heated, mouldy, and of poor quality, so that this butter has not been able to any great extent to fill the requirements of the trade. It is stated that there are to-day 100,000 casks of poor and inferior quality Siberian in cold store, for which there is little demand at the present time.

These factors have also been of great assistance in developing the margarine trade, because necessity has broken down the prejudice that existed in the minds of many people with respect to margarine, and by whom it is now preferred as an article of diet when compared with high-priced and inferior-quality butters. So long as these conditions exist, the greater, in my opinion, will be the development of the margarine industry.

In reviewing the butter situation to-day, while it is admitted that there is the probability that there will always be a market for good-quality butter, yet it has now to be recognized as a fact that the use of margarine is becoming more firmly established, and this must necessarily displace a proportionate amount of butter from the usual trade requirements.

NEW ZEALAND SHEEP AT THE PANAMA PACIFIC EXHIBITION.

FOLLOWING are particulars of the awards gained by New Zealand sheep in the live-stock competitions held in connection with the Panama Pacific Exhibition, San Francisco, last month, together with owners' names:—

Breed, Class, &c.	Name or Number.	Award.	Owner.
Corriedale—			
Ram, any age ..	Quality IV ..	Champion ..	C. H. Ensor.
Ewe, any age ..	Luck Brand ..	Champion ..	C. H. Ensor.
Ram, any age ..	Bold Brand ..	Reserve champion	C. H. Ensor.
Ram, 2 yrs. and over	Quality IV ..	First prize ..	C. H. Ensor.
Ram, 1 yr. and under 2 yrs.	Bold Brand ..	First prize ..	C. H. Ensor.
Ewe, under 1 yr.	Luck Brand ..	First prize ..	C. H. Ensor.
Ewe, under 1 yr.	Love Brand ..	Second prize ..	C. H. Ensor.
Ram, 1 yr. and under 2 yrs.	Land-o'-Song ..	Third prize ..	C. H. Ensor.
Romney—			
Ram, any age ..	No. 5936, R.M.F.B.	Champion ..	Alfred Matthews.
Ram, any age ..	No. 6653, R.M.F.B.	Reserve champion	William Perry.
Rams, 2 yrs. and over	No. 5936, R.M.F.B.	First prize ..	Alfred Matthews.
Ram, 2 yrs. and over	Windermere Grant	Second prize ..	D. G. Wright.
Ram, 2 yrs. and over	Windermere Wheeler	Third prize ..	D. G. Wright.
Ram, 1 yr. and under 2 yrs.	No. 6653, R.M.F.B.	First prize ..	William Perry.
Ram, 1 yr. and under 2 yrs.	Tipua	Second prize ..	G. E. Allen.
Ram, 1 yr. and under 2 yrs.	Windermere Goliath	Third prize ..	D. G. Wright.
Ram, 1 yr. and under 2 yrs.	No. 6652, R.M.F.B.	Fourth prize ..	William Perry.
Ram, 1 yr. and under 2 yrs.	No. 6650, R.M.F.B.	Fifth prize ..	Alfred Matthews.
Ram, 1 yr. and under 2 yrs.	Windermere Twin ..	Sixth prize ..	D. G. Wright.
Ram, under 1 yr.	No. 6654, R.M.F.B.	Second prize ..	William Perry.
Ram, under 1 yr.	No. 6655, R.M.F.B.	First prize ..	William Perry.
Ram, under 1 yr.	Bandsman ..	Fourth prize ..	G. E. Allen.
Lincoln—			
Ram, 1 yr. and under 2 yrs.	Big Chief.. ..	Fourth prize ..	William Perry.
Ram, 2 yrs. and over.	Napier IV ..	Fourth prize ..	William Perry.

Fruit Score-cards.—An error occurred in the model fruit score-cards published on page 336 of the October *Journal*. As printed, 10 points were allotted for "correct weight" of cased fruit and in packing competitions. This should have been "correct *height*."

AMERICAN GRAIN CROPS.

THE New Zealand Trade Commissioner at San Francisco (Mr. E. Clifton) writes under date 29th October, 1915, as follows:—

A very great movement of wheat through the United States is reported this month. It is shown that 4,267,000 bushels of wheat passed through New York and Canada since the early part of August for shipment to Great Britain and her allies. The object of this is to avoid the payment of 10 cents per bushel, the wheat being passed through in bond. The total export of wheat from New York from 1st August to 15th October exceeds 12,000,000 bushels, of which 7,000,000 is the product of the United States. It is expected that this heavy shipment of wheat will continue until March, 1916, when the crops from Argentina begin to move.

It is expected that the harvest this year will show the highest records for Canada as regards acreage and total yield. The wheat-yield is estimated at 308,839,800 bushels from 12,986,400 acres, representing an average yield per acre of 23·78 bushels; and that of oats 488,000,000 bushels from 11,365,000 acres, or 42·94 bushels per acre. Barley will yield 51,655,000 bushels; and two products that are comparatively neglected in New Zealand, ryecorn and flax-seed (European), will produce 2,385,700 bushels and 12,199,600 bushels respectively.

FORTHCOMING AGRICULTURAL SHOWS.

Tuapeka Agricultural Society: Annual Show at Lawrence, 27th December.

Waitahuna Farmers' Club: Annual Show at Waitahuna, 28th December.

Taieri Agricultural Society: Annual Show at Mosgiel, 20th January.

Woodville A. and P. Association: Annual Show at Woodville, 26th January.

Broadwood A and P. Association: Show at Broadwood, 27th January.

Helensville A. and P. Association: Annual Show at Helensville, 29th January.

Feilding Industrial A. and P. Association: Annual Show at Feilding, 1st and 2nd February.

Golden Bay A. and P. Association: Annual Show at Takaka, 1st February.

Central A. and P. Association: Annual Show at Waipukurau, 2nd February.

Tapanui Farmers' Club: Annual Show at Tapanui, 2nd February.

Dannevirke District A. and P. Association: Show at Dannevirke, 9th and 10th February.

Pahiatua-Akitio A. and P. Association: Annual Show at Pahiatua, 11th February.

Rangitikei A and P. Association: Autumn Show at Taihape, 23rd February.

Franklin A. and P. Association: Annual Show at Pukekohe, 25th and 26th February.

Opotiki A. and P. Association: Show at Opotiki, 2nd March.

Oruru A. and H. Society: Annual Show at Oruru, 3rd March

Ashburton A. and P. Association: Annual Show at Ashburton, 15th and 16th March.

Kaikoura A. and P. Association: Annual Show at Kaikoura, 17th March.

Temuka and Geraldine A. and P. Society: Show at Temuka 30th March.

Oxford A and P Association: Annual Show at Oxford, 6th April.

Mackenzie County A. and P. Society: Annual Show at Fairlie, 24th April.

NEW ZEALAND EXPORTS TO BRITAIN.

COMPILED FROM MANIFESTS OF VESSELS SAILED DURING RESPECTIVE MONTHS OF CURRENT AND PRECEDING SEASONS.

Month.		Mutton, Carcases.	Lamb, Carcases.	Beef, Quarters.	Pork, Carcases.	Butter, Boxes.	Cheese, Crates.	Wool, Bales.	Wheat, Sacks.	Oats, Sacks.	Rabbits, Crates.	Hemp, Bales.	Tow, Bales.	Kauri-gum, Cases.
January,	1915	137,816	296,439	45,622	339	138,081	85,123	87,393	..	..	2,860	683	..	1,209
,,	*1914*	*231,766*	*464,185*	*30,424*	*33*	*150,492*	*136,086*	*108,742*	..	*500*	*2,851*	*15,234*	*4,306*	*11,133*
February,	1915	433,585	517,581	77,421	311	119,371	96,090	159,347	..	..	..	13,111	6,619	2,763
,,	*1914*	*354,190*	*334,207*	*14,100*	*3*	*86,570*	*59,532*	*127,372*	..	*4*	..	*3,709*	*633*	*7,607*
March,	1915	80,439	203,480	30,176	..	55,280	51,811	49,809	..	..	..	8,410	185	274
,,	*1914*	*446,522*	*551,313*	*36,689*	..	*61,060*	*62,732*	*95,175*	..	..	..	*8,187*	*2,562*	*3,958*
April,	1915	286,155	328,779	45,340	..	6,703	38,561	41,371	..	..	1,011	9,328	1,474	3,461
,,	*1914*	*234,765*	*366,786*	*22,185*	..	*7,822*	*63,796*	*58,488*	..	*2,901*	..	*1,247*	*888*	*5,909*
May,	1915	257,953	433,831	34,780	655	148	17,065	21,615	..	..	2,923	4,968	808	2,636
,,	*1914*	*336,632*	*638,397*	*39,315*	*54*	*837*	*37,776*	*43,364*	*3,623*	*11,062*	..	*8,355*	*2,112*	*9,316*
June,	1915	99,080	154,785	19,316	932	..	26,869	11,946	..	..	9,800	5,027	1,320	1,229
,,	*1914*	*261,877*	*634,981*	*36,400*	..	*1,153*	*19,247*	*18,774*	..	*28,141*	*1,000*	*7,924*	*4,258*	*7,881*
July,	1915	243,420	340,476	21,231	154	..	21,520	16,039	..	..	5,968	5,068	1,639	4,184
,,	*1914*	*225,411*	*239,143*	*38,170*	..	*1,355*	*2,003*	*15,868*	..	*1,425*	*1,000*	*5,810*	*2,584*	*8,053*
August,	1915	510,418	570,381	51,750	35	..	18,287	19,416	..	..	31,790	7,138	1,466	4,848
,,	*1914*	*84,251*	*63,111*	*19,094*	*516*	*1,979*	*50*	*4,845*	*600*	*38,220*	*10,403*	*367*	*245*	*3,705*
September,	1915	299,715	330,643	59,487	..	26,416	2,595	5,360	..	..	7,750	2,022	3,091	595
,,	*1914*	*53,386*	*49,200*	*2,353*	..	*15,885*	..	*3,337*	..	*5,896*	*7,288*	*1,143*	*57*	..
October,	1915	367,198	417,794	87,104	..	111,468	49,160	7,272	..	..	56,636	5,650	1,645	1,230
,,	*1914*	*291,432*	*128,016*	*49,104*	..	*81,842*	*30,487*	*8,938*	..	*68,660*	*38,121*	*2,042*	*1,650*	*1,683*
November,	1915	93,777	92,601	21,609	..	81,102	47,243	18,715	..	..	13,538	5,064	1,789	868
,,	*1914*	*136,346*	*27,577*	*48,302*	*27*	*98,729*	*70,048*	*37,604*	*15*	*24,289*	*35,783*	*885*	*110*	*1,377*
December,	1914	192,952	149,835	44,876	..	172,990	80,144	86,317	..	..	9,306	1,136	116	2,157
,,	*1913*	*128,087*	*86,890*	*8,909*	..	*249,526*	*124,821*	*51,385*	..	*250*	*24,479*	*19,807*	*5,276*	*11,273*

LONDON MARKET VALUES.

COMPARATIVE STATEMENT COMPILED FROM THE HIGH COMMISSIONER'S CABLES FOR THE PAST THREE MONTHS.

London Date.	Wool. Bradford Quotations for Tops. 36's.	40's.	44's.	50's.	56's.	60's.	Mutton. Canterbury.	Mutton. North Island.	Lamb. Canterbury.	Lamb. Other than Canterbury.	Beef. New Zealand Hinds.	Beef. New Zealand Forces.	Butter. Danish.	Butter. New Zealand.	Cheese. New Zealand White.	Cheese. New Zealand Coloured.	Cheese. Canadian.	Hemp (Spot). New Zealand Good-fair.	Hemp (Spot). New Zealand Fair.	Hemp (Spot). Manila Fair (New Grade).	Hemp (Forward Shipment). New Zealand Good-fair.	Hemp (Forward Shipment). New Zealand Fair.	Hemp (Forward Shipment). Manila Fair (New Grade).	Wheat. Short-berried.	Wheat. Long-berried.	Oats. Sparrowbills.	Oats. Danish.
1915.							d.	d.	d.	d.	d.	d.															
Sept. 4	..	..	..	..	..	..	..	..	8⅛	8 7/16	..	..	168/0	..	75/0	74/0	76/0	32/0/0	30/0/0	..	32/0/0	30/0/0	38/10/0	..	..	..	..
„ 11	..	..	..	..	..	..	7⅜	..	8⅛	8 1/16	6½	6	175/0	..	76/0	75/0	76/0	33/10/0	31/10/0	40/0/0	33/0/0	32/0/0	38/10/0	..	..	..	..
„ 18	..	..	..	..	..	..	7⅜	..	8⅛	8⅛	6¼	5¾	179/0	..	76/0	77/0	77/0	33/0/0	31/0/0	38/10/0	32/10/0	30/10/0	..	..	..	..	..
„ 25	1/11	1/11½	2/1	2/4	2/8	3/1	7⅜	..	8⅛	8⅛	..	..	192/0	..	77/0	76/0	77/0	33/10/0	31/10/0	..	33/0/0	31/0/0	38/10/0	..	..	..	..
Oct. 2	..	..	..	..	..	..	7⅜	..	8⅛	8⅛	6	5	197/0	..	76/0	77/0	77/0	..	..	..	..	..	38/10/0	..	..	..	..
„ 9	..	..	..	..	..	..	7⅜	..	8⅛	7¾	..	..	207/0	..	76/0	77/0	77/0	33/0/0	31/0/0	38/0/0	..	..	..	..	..	..	..
„ 16	..	..	..	..	..	..	7⅜	..	8⅛	..	6	5	187/0	..	77/0	76/0	78/0	33/10/0	31/10/0	38/10/0	33/0/0	31/0/0	38/10/0	..	..	..	..
„ 23	..	..	..	..	..	..	7⅜	..	8⅛	8⅛	6	5	160/0	..	..	..	84/0	33/10/0	31/10/0	40/0/0	33/10/0	31/10/0	40/0/0	..	..	..	..
„ 30	..	..	..	..	..	..	7⅜	..	8⅛	8⅛	5⅝	4¾	161/0	161/0	82/0	82/0	84/0	34/10/0	32/10/0	41/0/0	34/10/0	32/10/0	41/0/0	..	..	..	..
Nov. 7	..	..	..	..	..	..	7¼	..	8	..	5⅜	4¾	162/0	161/0	83/0	83/0	84/0	35/0/0	33/0/0	42/0/0	34/10/0	32/10/0	..	..	..	..	..
„ 13	..	..	..	..	..	..	7⅛	..	7⅞	7¾	5¼	4⅜	172/0	..	..	..	87/0	36/0/0	34/0/0	41/10/0	35/10/0	33/10/0	41/0/0	..	..	..	..
„ 19	..	..	..	..	..	..	7	..	7⅞	7⅞	5⅛	4¾	178/0	162/0	..	..	88/0	36/0/0	34/0/0	41/10/0	35/10/0	33/10/0	41/0/0	..	..	..	..
„ 27	..	..	..	..	..	..	7	..	7¼	7⅜	5½	4¾	180/0	164/0	..	..	91/0	35/10/0	33/10/0	42/0/0	35/0/0	33/0/0	41/10/0	..	..	..	..
Dec. 4	..	..	..	..	..	..	7	..	7⅛	7⅞	..	..	181/0	169/0	90/0	89/0	91/0	36/0/0	34/10/0	44/10/0	35/10/0	33/10/0	44/0/0	..	..	..	..

STOCK EXPORTED.

THE following table shows the numbers and descriptions of stock exported from the Dominion during the month of November, 1915:—

Port of Shipment.	Horses.			Sheep.			Cattle.			Pigs.		Dogs.	
	To Australia.	To Eastern Pacific.	To Japan.	To Australia.	To Eastern Pacific.	To Montevideo.	To Australia.	To Eastern Pacific.	To Norfolk Island.	To Australia.	To Eastern Pacific.	To Australia.	To Eastern Pacific.
Auckland ..	..	54	..	..	197	..	..	14	..	..	50	..	..
Gisborne ..	31	..	..	..	..	..	..	..	..	..	..	..	..
Napier ..	..	..	..	..	..	..	..	..	..	..	..	..	..
Wellington ..	..	..	..	..	50	..	51	..	..	..	..	..	..
Lyttelton ..	2	..	..	..	..	..	..	..	..	..	..	..	..
Dunedin ..	..	..	..	11	..	..	..	..	..	..	..	..	..
Bluff ..	16	.	..	40	..	..	..	..	..	..	..	..	..
Totals ..	49	54	..	51	247	..	51	14	..	..	50	..	..

The following are particulars of the horses shipped: 1 thoroughbred stallion, 11 draught mares, 1 medium draught mare, 16 medium draught colts, 1 thoroughbred filly, 14 fillies, 1 hackney gelding, 1 harness gelding, 2 pony geldings, 1 trotting gelding, 1 trotting horse, 20 remounts, 2 draught colts.

Auckland also exported 15 crates poultry.

STOCK IN QUARANTINE.

THE following table shows the number and descriptions of stock exported from the Dominion during the month of November, 1915:—

No.	Description.	Sex.	Port of Origin.	Owner or Agent.	Address.
			MOTUIHI ISLAND (AUCKLAND).		
1	Yorkshire terrier	Male ..	London ..	Miss F. Williams ..	Auckland.
1	Collie dog ..	,, ..	,, ..	,, ..	,,
1	Pomeranian ..	,, ..	,, ..	Charles Bagley ..	,,
			SOMES ISLAND (WELLINGTON).		
1	Aberdeen Angus bull	Male ..	London ..	A. S. G. Carlyon ..	Tikokino.
1	Collie bitch ..	Female	,, ..	D. MacDonald ..	Dannevirke.
4	,, pups ..	Mixed	,, ..	,, ..	,,
			QUAIL ISLAND (LYTTELTON).		
1	Collie dog ..	Male ..	London ..	J. Lilico ..	Lochiel.
1	Large white boar	,, ..	Sydney ..	L. Wilson ..	Teddington.

HEMP AND TOW GRADING RETURNS.

NOVEMBER.

Hemp.—The total number of bales graded was 12,917, as compared with 5,679 for the corresponding month of last year, an increase of 7,238 bales. For the twelve months ending 30th November, 1915, the number of bales graded was 113,338, as compared with 106,095 for the previous twelve months, an increase of 7,243 bales.

Tow.—During the month 3,569 bales were dealt with, as compared with 1,452 for the corresponding month of last year, an increase of 2,117 bales. For the twelve months ending 30th November, 1915, the number of bales graded was 30,334, as compared with 32,885 for the previous twelve months, a decrease of 2,551 bales.

Stripper-slips.—The number of bales graded was 731, as compared with 91 for the corresponding month of last year, an increase of 640 bales. For the twelve months ending 30th November, 1915, the number of bales graded was 3,401, as compared with 2,212 for the previous twelve months, an increase of 1,189 bales.

HEMP, TOW, AND STRIPPER-SLIPS GRADED THROUGHOUT THE DOMINION DURING THE MONTH OF NOVEMBER, 1915.

Hemp.

Port.	Superior.	Fine.	Good-fair.	Fair.		Common.	Rejected.	Condemned.	Total.
				High Point.	Low Point.				
	Bales.	Bales.	Bales.	Bales.	Bales.	Bales.	Bales.	Bales.	Bales.
Auckland ..	..	..	236	872	764	119	1	..	1,992
Napier ..	..	..	..	..	..	..	..	..	..
Wairoa ..	..	..	87	..	..	..	..	..	87
Foxton ..	..	..	1,405	1,795	940	159	26	2	4,327
Wellington ..	..	6	697	2,474	1,140	155	25	4	4,501
Picton ..	..	65	42	..	..	..	..	..	107
Blenheim ..	..	..	279	5	..	..	..	..	284
Lyttelton ..	..	..	..	..	..	..	..	..	..
Dunedin ..	..	..	376	749	148	8	..	..	1,281
Bluff	..	..	194	103	40	1	..	..	338
Totals ..	..	71	3,316	5,998	3,032	442	52	6	12,917
Percentages of totals	..	0·56	25·67	46·43	23·47	3·42	0·40	0·5	..

Tow.

Port.	First Grade.	Second Grade.	Third Grade.	Condemned.	Total.
	Bales.	Bales.	Bales.	Bales.	Bales.
Auckland ..	..	197	506	36	739
Napier	..	..	..	..	..
Foxton ..	241	362	220	..	823
Wellington ..	307	589	245	19	1,160
Picton	..	40	..	..	40
Blenheim ..	138	53	..	..	191
Lyttelton ..	..	..	..	..	..
Dunedin ..	..	7	28	..	100
Bluff ..	62	200	228	26	516
Totals ..	748	1,513	1,227	81	3,569

Stripper-slips.—Auckland: Second grade, 24. Foxton: First grade, 7; second rade, 316; condemned, 46—total, 369. Wellington: First grade, 36; second grade, g 24 condemned, 8—total, 286. Blenheim: First grade, 20; second grade, 18—total, 38. Bluff: Second grade, 14.

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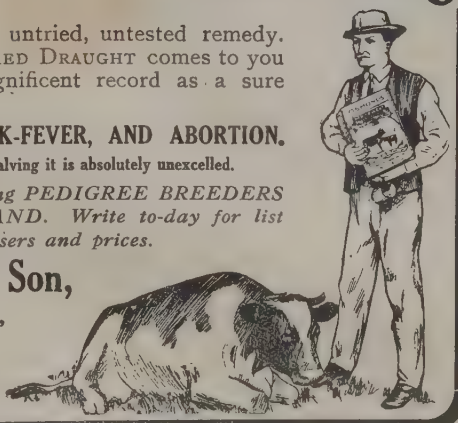

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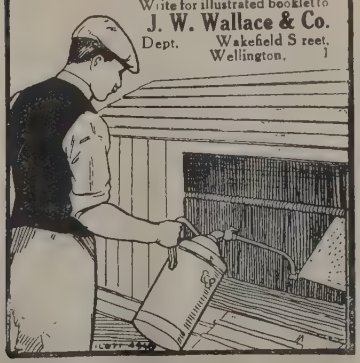

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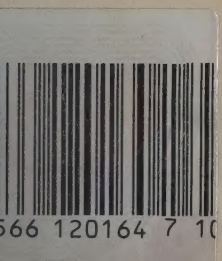
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